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# UNIVERSITY OF TORONTO



## REPORT OF THE DEAN OF THE FACULTY OF MEDICINE

*Session 1961-1962*

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## THE DEAN OF THE FACULTY OF MEDICINE

In his last report, Dr. MacFarlane remarked upon the close scrutiny to which medicine and the medical profession were being subjected. During the past year the creation of the Royal Commission on Health Services has forced not only the practising profession but also the schools of medicine to formulate their objectives and policy for the future. In doing this, the very searching questionnaire and visit of the Committee on Medical Education of the Royal Commission was of great assistance, but it must be acknowledged that the investigations of Dr. William Oille on the curriculum and teaching in this Faculty provided the basis for most of the information required by the Committee. The Faculty also provided information to the Association of Canadian Medical Colleges for their brief. In addition, two briefs were presented separately by the Faculty. The first was prepared principally by Dr. Oille and submitted on behalf of the Faculty Council. It was meant to supplement the brief of the Association of Canadian Medical Colleges and the information given to the Committee on Medical Education. The second brief was prepared principally by Dr. Robert Janes, on behalf of the teaching hospitals of the University of Toronto, to present those problems of the teaching hospitals that are unique.

I think it is fair to state that no matter what ultimate achievements derive from the recommendations of the Royal Commission, the subjection of the medical school and its teaching hospitals to the intensive self-analysis necessitated by the preparation of these briefs has been most beneficial.

One immediate result has been the closer co-operation of the teaching hospitals in the solution of common problems. The several meetings that have been held during the past year, under the chairmanship of the Dean, have already established their value to the individual hospitals and to the Faculty.

Dr. Oille has made much progress in his study of teaching, teaching practices and the curriculum, and has gathered a quantity of useful information. Much of this, as mentioned above, was of great value to the Royal Commission on Health Services. One immediate result of Dr. Oille's work has been the demonstration of the changing pattern of teaching, staff-student ratios, and total staff teaching load in the past decade. Without any increase in student enrolment in the Faculty of Medicine, the increase in teaching in the Division of Postgraduate Medical Education has added over 600 hours per annum, and the increase in teaching to students in other divisions of the University, an even greater amount of time. While there has been some increase in staff to compensate for the added teaching load, this has not kept pace with the increased teaching hours, particularly in some of the basic science departments. This problem is highly topical at present, because the University of Toronto, with more clinical teaching facilities than any other medical school in the Province of Ontario, has an obligation to attempt to graduate more doctors within five years. By that time the number of graduates from the four medical schools of this Province will be insufficient to look after the expanding population. A new medical school, even if a beginning is made this year, will not graduate its first class for ten years.

To increase the number of students in the Faculty by as much as 25 per year will not only throw a greater burden on the teaching staff, but will also present problems of space. The laboratory classrooms and some lecture rooms will be overcrowded, and clinic groups will have to be enlarged. For these reasons, the Faculty is of the opinion that an increase in student enrolment should only last until a new medical school is established.

In the fall of 1961, 125 students were admitted to the first premedical year and 48 students to the first medical year. In the ensuing year, 6 students dropped out of the first medical year, reducing the enrolment to 146. In order to ensure graduation of the maximum number under present limitations, a few more than 150 will be admitted to the first medical year.

The number of applicants for both the first premedical year and the first medical year has increased over last year by approximately 6 to 8 per cent. There is a similar increase in applicants for the Division of Rehabilitation Medicine and for courses given in the Division of Postgraduate Medical Education. A decision about the optimum size of these two divisions will soon have to be made.

Financial aid to students has again been a major concern to the Faculty, but during the past year the whole problem was most ably reorganized and placed on a sound basis by Mr. Vernon and Dr. Oille. A rate of reasonable expense has been established, so that the requirements of individual students in relation to their assets can be readily determined. Even with the generous help provided by the Medical Alumni Association, bursary aid still falls well below what is needed. Loan funds, however, are in ample supply.

The growth of research in the Faculty of Medicine has been assiduously cultivated by the staff at all levels, with very gratifying results as discussed below. However, there is one aspect of this programme that may prove increasingly difficult to resolve. Successful research programmes do not remain static, but demand increasing space, personnel and money. While the last is in relatively short supply, the total spent on research in the past academic year exceeds, by a small margin, the budget of the Faculty. There is no longer the difficulty in finding personnel that there was five years ago. The most pressing need today is for space, and with few exceptions, nearly every department lacks adequate research space. This is especially true in the clinical sciences. The assurance of a new building on the corner of Elizabeth and College Streets to house basic science and investigative laboratories to complement existing space in the Banting Institute does not answer the immediate problem.

A temporary relief is being obtained through acquisition of the house at 86 Queen's Park. This is being remodelled for laboratory purposes for the Department of Medicine. I should like at this time to acknowledge with gratitude the co-operation and assistance of the Vice-President (Administration), Mr. Stone, and the Superintendent, Mr. Hastie, in obtaining and modifying these premises for research.

The basic problem about clinical research—whether it should be conducted entirely in the teaching hospital, or only that part that must be conducted on the patient or in close proximity to him—has not been resolved. Similarly, the relationship of clinical science to basic science has not been clarified; this must be done, as there is grave danger of the basic science departments being weakened by growth of basic science laboratories in clinical departments. With the increasing amounts of research money becoming available to clinical departments, this is a real possibility.

At the present time the further growth of research space in teaching hospitals is problematical. The Toronto General, Toronto Western and St. Michael's Hospitals have all had major building programmes in the past ten years and have added or are about to add more research space. The total available, however, is limited and must remain so until such time as funds for capital expansion can be found. The Wellesley Hospital has just embarked on a campaign to provide beds, teaching space and research space. Of necessity, research space in the teaching hospitals is primarily for clinical investigation units, with associated laboratories. Space for experimental research, often involving the use of animals, is not usually available in the hospitals, and it is questionable whether it ever should be. At present, such space is available in the Banting Institute with additional space to be provided in the new building mentioned above.

Once again, the Medical Alumni Association entertained the graduating class the evening before Convocation, and also had as guests the class of 1912. On this occasion Dr. E. J. Clifford was presented with a Life Membership in the Association in recognition of his many years of devotion to the problems of the medical students and to the Alumni. The Dean was presented with a pair of white gloves as all the members of the graduating class passed without conditions or failures.

At the Convocation on June 15, Dr. R. F. Farquharson, Emeritus Professor of Medicine and Chairman of the Medical Research Council, and Dr. Carlos Chagas

of the National University of Brazil, were granted honorary degrees. Dr. Chagas, a distinguished biophysicist, at present with the United Nations in Geneva, gave a memorable address. One hundred and fifty medical students graduated. Diplomas were awarded to 21 students in Public Health, 6 in Medical Radiology, 1 in Art as Applied to Medicine, 20 in Psychiatry. At the Convocation of May 25, diplomas in Physical and Occupational Therapy were awarded to 52 students and in Speech Pathology and Audiology to 8 students. Degrees in Bachelor of Science (Medicine) were awarded to 3 students on June 15.

### *Staff*

Dr. A. C. Ritchie, formerly of the Department of Pathology, McGill University, was appointed Professor and Head of the Department of Pathology. Dr. Ritchie, a graduate of the University of Otago, New Zealand, did postgraduate work in the Department of Pathology at Oxford prior to coming to Canada.

In the Department of Medical Biophysics, Dr. A. W. Ham resigned as head of the Department in order to devote more time to writing and research. He is being succeeded by Dr. H. E. Johns, a member of the Department with an enviable reputation in the field of radiation physics.

Miss M. T. Wishart, Director and founder of the Department of Art as Applied to Medicine, is retiring this year, having established standards in her department that have gained international recognition for her and her students. She is being succeeded by Miss Nancy Joy, presently Assistant Professor in the Faculty of Medicine, University of Manitoba. Miss Joy had previously worked in the Department of Art as Applied to Medicine, and in the Department of Anatomy with Professor J. C. B. Grant.

Dr. A. C. Singleton is retiring as Professor and Head of the Department of Radiology, and Chief of Service in the Toronto General Hospital. The Department, under his guidance, has made sound contributions in research, and in particular in the training of radiologists. Dr. M. Hall, a member of the Department for many years, has succeeded Dr. Singleton as Head.

Dr. E. Harry Botterell, distinguished Chief of Neurosurgery in the Toronto General Hospital, and Professor of Surgery, has resigned to become Dean of Medicine at Queen's University. Dr. Botterell not only developed research, both experimental and clinical, in his field, but was an active and valued member of several Faculty committees that contributed much to the establishment of sound policy. He is succeeded as chief of the neurosurgical service in the Toronto General Hospital by Dr. T. P. Morley, who has been a member of the staff since coming to Toronto from England in 1952.

Dr. R. B. Slater of the Department of Paediatrics resigned to take up his new appointment as Dean of the Faculty of Medicine in the University of Vermont. We wish him every success in his new post.

Dr. W. Hurst Brown is retiring as chief of medicine at the Toronto Western Hospital. The University and the hospital are indebted to Dr. Brown for the excellence of teaching in his service and the fostering of research, both of which have contributed very significantly to the prestige of the hospital. He is being succeeded by Dr. I. M. Hilliard, formerly Professor of Medicine, University of Saskatchewan and at one time a member of the staff of the Toronto Western Hospital.

It is a pleasure to record that Dr. D. M. Whitelaw, formerly of the staff of the Department of Medicine, University of British Columbia, has been appointed chief of medicine in the Princess Margaret Hospital. This is a new post.

A number of members of staff have retired this session, including Drs. H. W. Johnston and A. D. T. Purdy from the Department of Obstetrics and Gynaecology; Dr. Norman Wrong from the Department of Medicine; Dr. A. W. M. White and Dr. L. T. Barclay from the Department of Surgery; Dr. W. R. F. Luke from the Department of Ophthalmology and Dr. G. C. Snell from the Department of Otolaryngology. The contribution of these men to the University was in giving that sound

clinical teaching to medical students that has been the strength of this medical school for several generations. On behalf of the Faculty, it is a pleasure to wish them many more years of health and happiness in practice.

It is with great sadness that I must record the death of Dr. John Oille in his 87th year. A graduate of the class of 1903, the first cardiologist on the University staff, and one-time acting head of the Department of Medicine, he will be remembered with affection and pride by the many students who had the good fortune to be in his clinic group. One of the most dynamic teachers the Faculty has ever had, his clinical standards have made an indelible impression on this Faculty.

I should like to express at this time the appreciation of the Faculty and their good wishes to three members of the non-academic staff who are retiring; they have given faithful service for many years, and have made important contributions to their respective departments: Miss M. Delamere of the Department of Biochemistry, and Miss V. L. McKinnon and Miss W. Simpson of the Department of Pathology.

### *Honours*

Professor K. J. R. Wightman was Lecturer in Medicine at the Regional Meeting of the Royal College of Physicians and Surgeons in Regina, and was made a member of the Council of the Canadian Association of Gastroenterology. Professor R. F. Farquharson was awarded the degree of Doctor of Medicine (*honoris causa*), University of Ottawa, and Doctor of Laws (*honoris causa*), University of Toronto. The Clinical Investigation Unit of the Toronto General Hospital was formally dedicated as the "Farquharson Unit." Dr. J. W. Graham was elected President of the Academy of Medicine of Toronto for 1962-3; Dr. J. C. Laidlaw, President of the Canadian Society for Clinical Investigation, and to membership in the American Society for Clinical Investigation; Dr. M. A. Ogryzlo, President of the Canadian Rheumatism Association; Dr. J. C. Richardson, President of the Association of Canadian Neurologists. Dr. W. T. W. Clarke was Chairman of the Section of Medicine, and Dr. J. S. Crawford, Chairman of the Section of Physical Medicine of the Ontario Medical Association. Dr. Crawford was also named Chairman of the Medical Board of Hillcrest Convalescent Hospital. Dr. Susan Lenkei was elected to membership in the American College of Chest Physicians. Dr. A. M. Park was made a Director of the Donwood Foundation. Dr. Norman Wrong was made an honorary member of the British Association of Dermatology.

Professor Philip Greey has been appointed to serve a third term of five years on the Expert Advisory Panel on Antibiotics of the World Health Organization. Professor Clement McCulloch is President of the Eye Alumni, Presbyterian Hospital, New York. Dr. R. G. C. Kelly was elected President of the VIIth Pan-American Congress of Ophthalmology, and Dr. H. M. Macrae President of the Canadian Ophthalmological Society. Professor P. E. Ireland was elected President of the Canadian Otolaryngological Society. Dr. Brydon Smith was made a Fellow of the American College of Surgeons and a Fellow of the American Otological Society. Dr. J. A. Sullivan was elected President of the American Otological Society.

Dr. R. Slater was appointed Dean of the Faculty of Medicine, University of Vermont. Dr. A. Sass-Kortsak was elected President of the Clinical Research Society of Toronto. Dr. B. Laski was elected to the American Pediatric Society. Professor J. A. Dauphinee was elected President of the Toronto Diabetes Association, and Dr. W. Paul President of the Eastern Great Lakes Chapter of the Society of Nuclear Medicine. Dr. W. Anderson has been elected President of the Medico-Legal Society of Toronto, and Secretary of the Section of Clinical Pathology of the Ontario Medical Association. Dr. D. W. Thompson was Chairman of the Section of Pathology, Academy of Medicine, and Dr. S. F. Penny Chairman of the Section of Pathology of the Ontario Medical Association.

Professor C. L. Ash delivered the Gordon E. Richards Memorial Lecture of the Canadian Association of Radiologists. Dr. R. B. Holmes was made an Honorary Member of the Detroit Roentgen Ray and Radium Society. Professor Charles H.

Best was elected a Foreign Member of the Royal Swedish Academy of Science. He was also elected a Knight of Mark Twain. Emeritus Professor C. B. Farrar was presented with the Editorial Chair at the 118th Annual Meeting of the American Psychiatric Association, in recognition of thirty years of service as Editor-in-Chief of the *American Journal of Psychiatry*. Dr. J. W. Lovett Doust was appointed Chairman of the Panel on Psychiatric Research, Defence Research Board.

Professor F. G. Kergin was elected to the Council of the Royal College of Physicians and Surgeons of Canada. Dr. W. G. Bigelow was the Louis Gross Memorial Lecturer at the Montreal Clinical Society. Dr. N. C. Delarue delivered the Peter Willinsky Lecture at the New Mount Sinai Hospital. Dr. S. D. Gordon was appointed to the Committee on Trauma of the American College of Surgeons. Dr. W. K. Lindsay was appointed Associate Editor of the *American Journal of Plastic and Reconstructive Surgery*. Dr. T. P. Morley was President of the Academy of Medicine, Toronto, during 1961-2. Dr. R. B. Salter was Visiting Professor of Orthopaedic Surgery to the Faculty of Medicine and Dentistry of the University of Rochester.

### Research

The reports and lists of publications from the various departments give a full picture of the volume and productivity of research. In addition to their publications, the academic staff has again been active and in demand in presenting papers at various national and international meetings. As stated earlier, while support for research is still lagging behind the demands of the investigators, space has become a more important limiting factor.

During the year, generous donations for the support of research were received from many individual donors. A noteworthy gift from the Johnson Wax Company was received for the establishment of a steroid laboratory in the Department of Obstetrics and Gynaecology and for the support of a laboratory in Medical Electronics. This latter is a new and highly significant development fostered jointly by the Faculties of Applied Science and Engineering and Medicine. At present, the principle of an Institute of Medical Electronics has been accepted by the School of Graduate Studies and a Director appointed—Professor Moody of the Department of Electrical Engineering. Appointments to the Institute from the Faculty of Medicine will be made from time to time to facilitate the investigation of problems of instrumentation of biological function. To date, most of the investigation has been in the cardiovascular field, but it is anticipated that the collaboration between the two faculties will have very far reaching results in many fields of medicine and biology.

Once again it is a pleasure to record the understanding co-operation of the voluntary granting bodies in the aid of research. We are indebted to the Atkinson Charitable Foundation, the J. P. Bickell Foundation, the National and Ontario Heart Foundations, the Canadian Arthritis and Rheumatism Society, the National Cancer Institute, the Canadian and Ontario Cancer Societies, the McLaughlin Foundation, and the Markle Foundation and the National Institutes of Health of the United States. The support of the Medical Research Council, the Province of Ontario and the Department of National Health and Welfare continue to be of major importance to the continuation of research in this Faculty.

### Visitors

Again the Faculty of Medicine has had the pleasure of visits from many scientists from abroad, including Sir George Pickering, Dr. Paul Wood and Sir Rudolph Peters from Great Britain; Professor Baranowski from Poland; Dr. A. T. Hansen from Copenhagen; and Dr. Jurgen Steinke from Boston.

Dr. L. T. Hilliard, an eminent authority on mental retardation from London, was appointed Visiting Professor of Psychiatry. Dr. Allan Kekwick, Professor of Medicine in the Middlesex Hospital, was Visiting Professor in Medicine during the month of March.

The Balfour lecture was given by Professor Charles Rob of Rochester, N.Y.; the

Harry Shields lecture by Professor R. D. Dripps; the Walter Wright lecture by Professor M. J. Hogan; and the Phi Delta Epsilon lecture by Dr. William Boyd, Emeritus Professor of Pathology.

It is a pleasure to express my thanks to the secretarial staff for their co-operation and assistance, and to the Faculty Council and the President for support and understanding throughout a difficult year.

JOHN HAMILTON

## DIVISION OF POSTGRADUATE MEDICAL EDUCATION

*Under the direction of Professor R. Ian Macdonald*

During the past year the Postgraduate Division of the Faculty pursued its objectives of providing opportunities for doctors in practice to acquire new knowledge and techniques applicable to their own fields and of giving assistance when called on for graduate training programmes in different departments of the School. The Division has collaborated in several important courses planned and given by the faculty of the School of Hygiene. In all postgraduate courses the department or faculty primarily responsible has drawn freely from other departments in the University and occasionally visiting teachers have been invited to contribute their special knowledge and experience.

During 1961-2, 1,051 students were registered with the Division. Of these, 415 were graduate students working and studying full time in different clinical and basic science departments: 93 were enrolled in Diploma courses, 70 were registered in sessional courses, there were 5 proceeding to the B.Sc. (Med.) degree and 247 were internes, residents and fellows training under the close supervision of members of the Faculty of Medicine. As this phase of medical education is, in many instances, equal in duration to or longer than the undergraduate phase it makes much heavier demands on university staff time than is generally recognized. It is an important university contribution both to education and to the health care of Canadians. Five hundred and sixty-four graduates attended one or more of the fourteen special refresher courses for doctors in practice. These courses were both special and general and they were designed particularly to meet the needs of men in active practice or in public health or in industrial medicine. The decentralized clinic programme brought twenty-eight teams of university teachers to ten centres in Ontario. These carefully planned clinics enabled doctors in practice to take an active part in postgraduate programmes in their own hospitals. The advanced graduate courses in Medicine, Surgery and Obstetrics and Gynaecology again attracted a large number of graduates with special interests. Seventy-two of these spent six weeks taking instruction in these full time annual courses.

The ferment of interest in patient care and in medical education excited by the hearings of the Royal Commission on Health Services prompted a review of the organization and experience of the Division. A report on these matters was presented to Dr. J. A. MacFarlane and his colleagues on a special sub-committee charged with preparing a report on medical education in Canada. A less detailed report was prepared in answer to inquiries about the Division and its functions from medical schools now considering formation of postgraduate departments. In summary these reports emphasize that the purpose of postgraduate medical education is to provide opportunities for the continuing education of both specialists and general practitioners, and that to be successful it requires an organization with teaching resources, a sound administration capable of providing direction and continuity of effort, a staff sufficiently experienced in medicine and in teaching to formulate and carry out long-term plans, and the proper financial support to provide for healthy expansion. When all these exist a good deal of support can be given to graduate programmes of different departments. It also emphasized that university medical schools are the only

bodies possessing the assets necessary to maintain an efficient postgraduate programme.

During the year the Director of the Division continued to co-operate closely with the Education Committee of the Ontario Medical Association and he also served as a member of the Advisory Committee on Scientific Research and Development of the Royal Commission on Government Organization.

DIVISION OF REHABILITATION MEDICINE

*Under the direction of Dr. A. T. Jousse*

In the autumn of 1961, the Division of Rehabilitation Medicine was transferred from Devonshire Place to the old Engineering Building. The University authorities responsible for the relocation were successful, by virtue of good planning and skilful execution of these plans, in transforming the allotted space into most satisfactory quarters for instruction, study and relaxation. The renovation and transfer was achieved with a minimum of dislocation of the training programme. The new quarters are a great improvement on the old in terms of location, space and equipment.

Total registration has increased, largely owing to the increased enrolment in the diploma course in Physical and Occupational Therapy.

The registration is as shown below.

GRADUATE INSTRUCTION

Physiatrist . . . . .	1
Speech Pathology and Audiology . . . . .	13
Postgraduate course in Physical Therapy (Teacher Training course) . . . . .	3

UNDERGRADUATE TRAINING

Physical and Occupational Therapy . . . . .	232
Foreign-trained Occasional Students (for completion of qualifications) . . . . .	4

Of the total registrants, the following graduated at the May Convocation: Speech Pathology and Audiology, 8; Postgraduate Course in Physical Therapy, 1; Physical and Occupational Therapy, 52.

In addition, instruction was provided for the two final years in the undergraduate course in Medicine, as well as to certain graduate groups.

Many members of the medical faculty have contributed of their time and talents for the instruction of therapists and their contribution is greatly appreciated.

A special postgraduate course in Speech Pathology and Audiology was offered during the term, through the Division of Postgraduate Medical Education. This one-day course was well received by those who attended as it proved both interesting and instructive.

The undergraduates were busy in diverse ways. Once more, they presented Open House and it was well attended. This undergraduate effort is one of the more effective methods of publicizing the work of therapists in the health field and of recruiting to the ranks.

Expansion of Rehabilitation Services in the teaching hospitals was made possible through a grant of \$20,000 from the Department of Health of Ontario. These funds may be used to further teaching, research and patient care. Thus far, a Physiatrist has been added to the staff of the Toronto Western Hospital, an Orthetist to the staff of the Wellesley Hospital and a brace shop equipped and placed in operation; a new department of Speech Pathology has been opened through the division in the department at the Wellesley Hospital. This will strengthen our teaching and research programme.

The Physical and Occupational Therapy teaching staff will lose the services of Miss Ruth Bradshaw, instructor in Physical Therapy, who has resigned in order to

assume the post of Director of Teaching in the School of Physical Therapy at the University of Alberta. Miss Bradshaw has made a great contribution to the teaching programme in Toronto and will be greatly missed. Our good wishes go with her in her new endeavour.

Miss Bradshaw's position will be filled by Mrs. Patricia Pearce. Mrs. Pearce is a teacher of Physical Therapy, trained in Britain. She taught at McGill University for several sessions and has been doing clinical work in Vancouver for the past year.

Miss Jean Gilroy will also join the staff in Physical Therapy. Miss Gilroy is a graduate of the postgraduate course in Physical Therapy, in May, 1962.

During the past year many members of the teaching staff have participated in the writing of briefs to be presented to the Royal Commission on Health. This has required that each individual so engaged make a careful scrutiny of the particular professional group or organization on whose behalf the brief has been written. As a consequence, without regard to the influence the brief may exercise, all who participated in the work of preparing the briefs were rendered more knowledgeable by virtue of their efforts.

### RESEARCH

At the Toronto Western Hospital, Dr. John Crawford and associates are carrying out a study on the Rehabilitation of lower extremity amputees.

Miss Donalda McGeachy is continuing her study of the dysphasic component present in many hemiplegics.

At the Oesophageal Speech Centre in the Princess Margaret Hospital Hostel a clinical research project into the natural history of laryngectomized patients is being carried out.

The new Department of Orthotics recently opened in the Wellesley Hospital has for its primary purpose research in the creation of braces and prostheses. The programme which has just started should be productive in the near future.

A research project is under way in co-operation with the Toronto Board of Education. The aim of this project is to determine the incidence of speech defects in school children, the natural history of these speech defects, and the influence of treatment on the resolution of the defect. This project will be carried out over the next three or four years.

A clinical study on the rehabilitation of those suffering from multiple sclerosis has been completed and the results will soon be published. A further project of a similar nature is being carried out in order to ascertain the results of rehabilitation measures as applied to those persons who suffer hemiplegia due to vascular disease.

### REHABILITATION MEDICINE

GODFREY, C. M. "An Epidemic of Tri-Ortho-Cresyl Phosphate Poisoning" (*Canadian Medical Association Journal*, vol. 85, no. 38, Sept. 16, 1961, pp. 689-91).

——— "Fighting Disease in Morocco" (*Medical Graduate*, vol. 8, no. 2, 1961-2, pp. 4-5).

——— "Medicine in Morocco" (*Ontario Medical Review*, vol. 29, no. 6, June, 1962, pp. 459-60).

——— "The Speech Therapy Centre to 1960-61" (*Annual Report of Ontario Cancer and Research Foundation*, 1961, pp. 55-6).

GODFREY, C. M. and ASH, C. L. "The Treatment of Peripheral Lymphoedema" (film). Rehabilitation Series no. 1, sponsored by Princess Margaret Hospital, 16 mm., colour, 12 minutes.

GODFREY, C. M. and JOUSSE, A. T. "A Clinical Study of a Vibratory Device" (*Applied Therapeutics*, vol. 37, no. 12, Dec., 1961, pp. 988-9).

GODFREY, C. M. and LAWSON, G. A. "Mechanical Effects of Exercise, Traction and Bracing on Cervical and Lumbar Spine" (*Proceedings of the Second Canadian Conference on Research in Rheumatic Diseases*, Oct. 28-9, 1960, pp. 34-5).

JOUSSE, A. T., BREITHAUPT, D. J. and WYNN-JONES, M. "Late Causes of Death and Life Expectancy in Paraplegia" (*Canadian Medical Association Journal*, vol. 85, no. 28, July 8, 1961, pp. 73-7).

MEDICAL SOCIETY

(September, 1961, to June, 1962)

<i>Honorary President</i>	. . . . .	Dean J. D. Hamilton
<i>Honorary Secretary-Treasurer</i>	. . . . .	Dr. W. Paul
<i>Chairman</i>	. . . . .	Dr. C. Bull
<i>President</i>	. . . . .	F. Lewis
<i>Vice-President</i>	. . . . .	S. Cassin
<i>Treasurer</i>	. . . . .	K. Moses
<i>Secretary</i>	. . . . .	D. Kalnins

This year was an exciting one for the Medical Society. Among the outstanding events was the retirement of the first full-time Dean of the Faculty, Dr. J. A. MacFarlane; the installation of a new Dean, Dr. J. Hamilton; the hiring of a part-time secretary; the rejection of C.A.M.S.I. brief to the Royal Commission; and an increase in interne salaries.

The Medical Assembly, the governing body of the society, had biweekly and well-attended meetings under the capable direction of the chairman, Dr. C. Bull. His keen interest in and advice to the assembly earned a unanimous vote of thanks at the end of the year.

The first major function of the Assembly began with a vote of thanks to the retiring Dean, Dr. J. A. MacFarlane, for the advice he had given to the students during his years as Dean. He was presented with six trees to be planted at his summer home in the Caledon Hills, each tree representing one of the six years of Medicine. It is hoped that these trees will represent to Dr. MacFarlane the growth of those students who graduated from this Faculty under his leadership and will fulfill the motto of the University "Velut Arbor Aevo."

Dr. Hamilton officially became Dean of the Faculty on July 1, 1961, and his appointment has received unanimous approval from the students of the Faculty. His keen interest in and support of the students, for which he was well known during his years as Head of the Department of Pathology, has contributed much during his first year as Dean, and it is with a great deal of pride that students of Medicine at the University of Toronto can boast of a Dean with the personality and ability of Dr. J. Hamilton.

The business of the Medical Society tends to become more demanding and involved each academic year, so much so that it was deemed advisable this year to hire a Secretary to aid in keeping an organized filing system and to look after the ever-increasing amount of correspondence. Mrs. Grace Kocher, working on a part-time basis, was invaluable to the Assembly and it is felt that with her interest in the affairs of the Society she will be able to provide some continuity from year to year in its activities.

C.A.M.S.I. under the direction of Tom Borland continued to provide the student body with equipment at much reduced cost and in fact is at the moment considering asking permission from the Faculty for the establishment of a C.A.M.S.I. store in the Medical Building, feeling that the turnover of material and the money involved requires more organized supervision than has been present over the years. As in 1960-61 the local C.A.M.S.I. group found itself disagreeing with National C.A.M.S.I. This disagreement arose out of a brief which National C.A.M.S.I. was to present to the Royal Commission on Health Services. The brief had to do with internes and residents, financial assistance to medical undergraduate students, recruitment of applicants to Canadian medical colleges and future opportunities in Canada for the study of medicine. This brief was forwarded to the Medical Society with the request that it be read and approved within forty-eight hours. We were forced to reject this brief feeling that it was not possible to obtain informed opinion and support on such a vital and complex matter within the time specified. All of the Canadian medical schools were notified of our step and some of the other schools gave us their support.

The Medical Assembly and local C.A.M.S.I. investigated the question of interne "salaries" in the teaching hospitals in Toronto. The investigating committee felt that an increase in salary to the interne should be considered an aid to education in a time when there is compulsory internship and mounting costs of medical education. The four teaching hospitals of Toronto met with members of this committee and the final outcome was an increase from \$150.00 per month to \$175.00 per month effective July 1, 1962.

The social functions during the year were very successful. In the fall Dave Heaslip organized an excellent reception for the freshmen. They were officially welcomed to the Faculty with a banquet held at Hart House. Warden McCulley was the guest speaker and gave a very stimulating address. The Medical Society, realizing the financial failure of a fall dance at Hart House, this year ran a dance called "The Fall Kickoff" at the Regency Towers hotel. It was an enjoyable affair and while some financial loss was suffered, it was minimal enough to warrant another try in the coming year. The Medical-At-Home was a great success, both socially and financially. Stan Cassin and his committee of class presidents worked very hard and were rewarded by good attendance and compliments from all who attended.

The *Medical Journal* had another successful year following the change in format introduced one year ago. The subscriptions to the *Journal* increased by 225 which means a net increase in income for the *Journal* of \$1,125 yearly. The staff under the direction of the Editor, Mr. Walter Spitzer, through hard work and co-operation of the student body published a journal ranking high in calibre among undergraduate journals published in North America.

*Probe* published two issues during this year. These were of outstanding calibre and brought out the artistic and literary abilities of the students of Medicine. Bernie Raxlan and his staff received compliments from both students and staff. While the Society was happy with the magazines there was a feeling that *Probe* does not offer the students current news of faculty activities. Consequently in the coming year it is expected that as well as the *Probe*, as we now know it, a newspaper will be published at frequent intervals to keep the student alert to the functions taking place within the faculty.

Daffydil was again original and a great success. The student participation in its production surely indicates that medical students are not as apathetic as some would have us believe. The show ran for five nights with capacity houses and the applause given the show was a well-deserved compliment to the chairman, David MacGregor, and his committee.

The staff-student committee had a very successful year with strong support being given the Committee by the staff representatives, Drs. Wm. Oille, H. Kalant and J. L. Harkins. Among the topics discussed by this committee were: interdepartmental co-ordination, revision of present laboratory courses in the pre-Medical and Medical years, pre-Medical curriculum, and revision of the mentor system.

The Duncan Room enjoyed a successful year financially. Half of the profits go back into the room and the other half into the treasury of the Medical Society to be used for special projects and gifts and donations to worthy causes on campus, for example, University Settlement; Canadian Overseas Volunteers; NDCUS Writers workshop; Share Campaign. Prior to this year these groups have never been budgeted for by the Medical Society and it has been felt that we have a responsibility in contributing to the useful work done by such organizations.

There are many other activities in which the Medical Assembly members are involved. The Arts and Letters Society and representatives on campus organizations such as S.A.C., N.F.C.U.S. and W.U.S. have all played a full and important role during the year. The Medical Athletic and Medical Women's Undergraduate Associations each have their own account in this Report.

The last Assembly function to be mentioned here is that of the budget. Miss Kay Moses, the Treasurer, has made a great attempt this year to stay within the available budget and not go into debt. As a result of her efforts and the co-operation of the

Assembly members the expected loss at the beginning of September, 1962, will not be more than \$340. This is a tremendous feat in that a debt of \$800 incurred over the past years has now been paid off.

The Medical Alumni Association plays an important role in the life of many Medical students. The alumni are keenly interested in the undergraduate as exemplified by the support given to the students in the form of bursaries, scholarships and loans, and the functions sponsored by the Alumni, for example the General Practice Panel and the Graduation Banquet.

In closing this report, I wish to thank Dean Hamilton (Honorary President) and Dr. Paul (Honorary Treasurer) for the tremendous support given to the assembly over the year.

My sincere thanks go to all members of the Medical Assembly and the Society for the support given to me during the year. While it is not feasible to name all the people who have contributed to the undergraduate life of the Faculty, their efforts have been truly appreciated and I trust they will assist the new assembly in their endeavour. To the new President, Bob Galway, I wish every success.

FRANK LEWIS

MEDICAL ATHLETIC ASSOCIATION

(September, 1961, to June, 1962)

<i>President</i> . . . . .	B. K. Cutler
<i>Vice-President</i> . . . . .	J. H. Hall
<i>Secretary-Treasurer</i> . . . . .	G. S. Watkin
<i>Publicity Director</i> . . . . .	J. W. James
<i>Quartermasters</i> . . . . .	P. A. Kopplin
	U. V. Aasoja

YEAR REPRESENTATIVES

<i>IV Medical Year</i> . . . . .	D. C. McGillivray
<i>III Medical Year</i> . . . . .	P. L. Langlois
<i>II Medical Year</i> . . . . .	R. V. Repo
<i>I Medical Year</i> . . . . .	M. R. Goldberg
<i>II Premedical Year</i> . . . . .	R. Hudson
<i>I Premedical Year</i> . . . . .	N. Kane

A widely varied programme of athletic activities, with some 520 medical undergraduates participating, was offered for the academic session 1961-2. A definite shift in interest was noticed, which has prompted a corresponding change in support by the Association.

Thus we had a highly successful golf tournament to start off the year with close to 100 entrants, a sharp rise over 1957's 4 entrants and over 1961's 31 entrants. Participation was so heavy that darkness had fallen before many were able to finish and for scoring purposes, nine holes only were considered.

Football got off to a rather late start and though coached well, suffered from lack of support. Soccer was quite successful with I Meds losing narrowly to a powerful Trinity team in the Interfaculty final.

In lacrosse, the II Premeds reached the Interfaculty semi-finals. The Rugger team, boosted by the services of some postgraduate students, Dr. Andy Baines and Dr. Bob Murray, made its way to the finals but was unsuccessful there.

Hockey was another demonstration of the shift in emphasis. Although previously well-supported, the four teams entered defaulted several games for lack of players. I Meds, however, again coached by S. R. McNeill, finished the regular season tied for second place having defeated the surprised St. Michael's College A's in the quarter finals in overtime. The same Victoria team that eliminated Meds last year again proved far too strong and went on to take the Jennings Cup.

Waterpolo saw all five Meds teams win their leagues but all but one were defeated in the quarter-finals. The lone survivor went down to defeat in the semi-finals. Swimming found somewhat greater success with Meds teams winning both Interfaculty meets, on the first occasion owing to strong support aroused in the Second Medical year by G. S. Watkin, on the second by excellent swimming on the part of Graeme Barber (I Premeds), Walter Unger (I Meds), and Joseph MacInnis (IV Meds). Squash saw the II Meds team win the Interfaculty championship by a wide margin of superiority. Volleyball, with some ten teams entered, finished with IV Meds making a final fling at glory and winning the championship in an all-Medicine final, over III Meds.

### *Awards*

J. A. Zadiyko (IV Meds) was presented with the Athletic Stick, adjudged by his classmates to have contributed the most to Athletics throughout the undergraduate years. Executive keys for leadership were awarded to P. A. Kopplin (III Meds) and J. H. Hall (III Meds). The Tom Boeschenstein Award was not presented this year as the executive did not feel any of the nominees sufficiently worthy. A gracious note, together with a substantial contribution, was received by the Association from Professor Boeschenstein, and is gratefully acknowledged here.

The Treasurer again reports a balanced budget and is to be commended.

John Hall, the chairman of the Interfaculty Sports Committee for the current year, and the Athletic Association's vice-president also deserves mention for his excellent administration.

The Association's policy of building up equipment supplies in one sport each year has achieved a good measure of success and the incoming executive will start next season very well outfitted. This is owing in no small way to the untiring efforts of this year's Quartermasters.

A thorough revision of the awards point records for the faculty was made by R. V. Repo (II Meds) and brought up to date for the current session.

Athletics are an incomparable medium for self-expression and essential to the well-being of every aspiring physician. It is the aim of the Athletic Association to include every undergraduate in its programme in some way, no matter how small.

I would wish every success to Walter James and his new executive in achieving that goal.

BARRY R. CUTLER

## MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September, 1961, to June, 1962)

<i>Honorary President</i> . . . . .	Dr. Marjorie Moore
<i>President</i> . . . . .	Mary Lou Waite
<i>Vice-President</i> . . . . .	Marion Jewell
<i>SAC Representative</i> . . . . .	Lavina Lickley
<i>Treasurer</i> . . . . .	Ann Archer
<i>Social Convener</i> . . . . .	Janet Fisher
<i>I Premedical Representative</i> . . . . .	Teresa Lingys

The activities of the Association commenced in the fall with a tea held at the home of Lavina Lickley. This proved an opportunity to welcome the new girls into the faculty.

In October the annual Initiation Banquet was held at the Town and Country with over 90 persons in attendance, including several graduate women doctors. Dr. Boyd Neel was a very interesting speaker, and brought us up to date on activities of the Faculty and School of Music.

The Christmas party held in the Duncan Room was a popular event. Gifts were

brought for the children of the University Settlement House and the annual business meeting was held at the conclusion of the party.

The graduate doctors have participated in a number of activities. The Federation of Medical Women of Canada provided a tea in the fall at Women's College Hospital, and also gave a graduation dinner to the girls in the final year. The Medical Alumni Association sponsored a very interesting and informative evening entitled "Medical Careers for Women." Talks were given on the subjects of ear, nose and throat, medical research, gastroenterology and general practice. The girls are enthusiastic about this type of programme.

During the year, certain improvements were made in the Common Room. New furniture, which was urgently needed, increased the seating capacity. More room, however, is still needed.

All activities during the year were well attended and received enthusiastic support. The M.W.U.A. is a valuable association with respect to undergraduate life and integration of the graduates and undergraduates.

Our honorary president, Dr. Moore, has been a great asset to the group this year. Her support and counsel have been appreciated.

The executive has worked well together and I wish to thank them, and to wish next year's executive under Kay Moses every success.

MARY LOU WAITE

MEDICAL WOMEN'S UNDERGRADUATE ATHLETIC  
ASSOCIATION

(September, 1961, to June, 1962)

<i>President</i>	. . . . .	Inara Grava
<i>Vice-President</i>	. . . . .	Nadine Hradsky
<i>Treasurer</i>	. . . . .	Ann Griffin
<i>Secretary</i>	. . . . .	Sharon Bernstein

During 1961-2 Medicine entered participants in the following intramural sports: tennis, badminton, swimming, archery, basketball, volleyball and hockey. Because of lack of interest, there was no baseball team this year.

Results were best in volleyball, where Medicine reached the semi-finals only to be defeated by P.H.E. In both basketball and hockey, the teams placed second in their respective leagues. In individual sports, there were no notable achievements, but the girls who participated showed great enthusiasm and spirit.

The athletic season ended with our annual banquet on March 5, 1962, held at Kwong Chow Restaurant. The guest speaker, Dr. T. S. Leeson, related some incidents in the life of a medical student in England. Awards made at the banquet included four Premedical Bars, three Medical "M's," and three University of Toronto awards—one Junior "T," one Senior "T," and one Silver "T."

I should like to thank this year's executive and all the girls in the faculty who participated in athletics, for making this a successful year in sports.

INARA GRAVA

SCIENCE AND MEDICINE DEPARTMENT  
UNIVERSITY LIBRARY

*Reported by Mrs. M. Galt*

With the reorganization of the University Library into subject divisions, a Science and Medicine Department has been formed comprising two divisions, the

Physical and Applied Sciences Division and the Biological and Medical Division. This became effective June, 1962.

In accordance with the policy of the Library Committee of the Faculty of Medicine to review the collection every five years, departments have appointed staff members to check the present holdings and make recommendations. This is in progress.

At a meeting of Canadian medical school librarians, held in Ottawa in February to consider the problems of giving adequate support to the research programmes at the various universities, a Committee on Medical Science Libraries of the Canadian Library Association was formed. As a result of this meeting, a survey is being made of library facilities available at each of the twelve medical schools. When completed, it will be presented to the Medical Education Project of the Royal Commission on Health Services.

A large number of periodicals and monographs from the Lister Library have been presented by the Department of Medicine. These are a very valuable supplement to the medical collection, and will help us to fill the ever-increasing staff demand via the Delivery Service.

REPORT ON REGISTRATION, SESSION 1962-3

First Premedical Year . . . . .	135
Second Premedical Year . . . . .	109
First Medical Year . . . . .	174
Second Medical Year . . . . .	142
Third Medical Year . . . . .	133
Fourth Medical Year . . . . .	147
Special Students . . . . .	4
Art as Applied to Medicine . . . . .	5
Bachelor of Science (Medicine) . . . . .	2
B.Sc. (Med.) Summer Session . . . . .	8
(also registered in medical undergraduate years)	
Diploma in Medical Radiology . . . . .	14
Diploma in Psychiatry . . . . .	50
Diploma in Public Health . . . . .	22
Diploma in Industrial Health . . . . .	6
Diploma in Anaesthesia . . . . .	16
Graduate students . . . . .	280
Physical and Occupational Therapy . . . . .	304
Speech Pathology and Audiology . . . . .	11
Student Teachers . . . . .	4
Occasionals (special students) . . . . .	2
	<hr/>
	1,568

FELLOWSHIPS, SCHOLARSHIPS, MEDALS AND PRIZES

*Awarded at Convocation, June, 1962*

GRADUATE

Graham Campbell Prize . . . . .	T. D. R. Briant, M.D., F.R.C.S.(C).
Canadian National Institute for the Blind Fellowships	N.A. Wine, B.A., M.D. (Sask.). H.L.R. Wiebe, B.A. (Sask.), M.D., (Alta.).
W. P. Caven Memorial Fellowships . . . . .	C. T. Chou, B.Sc., M.D., M.Sc. M. Gold, B.A., M.A. R. Steeves, M.D. (U.W.O.).
Elizabeth Arbuthnot Dyson Fellowship . . . . .	S. Gartha, M.D. (Budapest)
William Goldie Prize . . . . .	K. W. G. Brown, B.Sc. (Med.), M.D., F.R.C.P.(C).
Doctor Arthur F. Haasz Fellowship . . . . .	D. L. Schatz, M.D.
Stuart Alan Hoffman Memorial Prize . . . . .	L. A. Wright, M.Sc. (McG.).
Arch Hutchison Fellowship . . . . .	R. Volpe, M.D., F.R.C.P. (C).
Frances Esther Hutchison Fellowship . . . . .	D. E. Wood, M.D.
Interlake Research Award . . . . .	M. G. Williams, M.D. (Man.), M.R.C.P. (Edin.).

Lister Prize . . . . .	G. A. Trusler, B.Sc., M.D., F.R.C.S. (C).
Alexander McPhedran Research Fellowship . . . . .	L. H. Opie, M.B., Ch.B. (Cape.), D.Phil. (Oxon., Cape.), M.R.C.P. (Lond.).
Minister of Health Gold Medal . . . . .	L. P. Solursh, M.D.
James H. Richardson Research Fellowship . . . . .	R. C. Ower, B.Sc., M.D. (Alta.).
Anna Bradbury Springer Fellowship . . . . .	J. R. Hamilton, B.Sc. (Med.), M.D.
Starr Medals . . . . .	C. K. Gorman, M.B., Ch.B., M.D. (Belf.), B.Sc. (Med.). J. Schatzker, M.D.
John Alexander Stewart Fellowship . . . . .	T. W. Fox, M.D. R. Taylor, B.A., B.Sc., M.D. (Man.), M.A.
Helen L. Vanderveer Fellowship . . . . .	M. Vidinli, M.D. (Ankara). M. A. Hooey, M.D.

UNDERGRADUATE

Fourth Medical Year

Cody Gold Medal . . . . .	I. Lipton
Cody Silver Medal . . . . .	Mrs. E. F. M. Borins
Cody Silver Medal . . . . .	M. H. Lipson
Dr. Benjamin W. Appleton Prize in Psychiatry . . . . .	J. S. Chapnik } M. H. Lipson } <i>Aeq.</i>
Butterworth Prize . . . . .	A. E. Gross
J. P. Boley Prize in Ophthalmology . . . . .	J. D. Hunt
Chappell Prize in Clinical Medicine . . . . .	I. Lipton
Dr. Jacob Goldstein Scholarship in Obstetrics and Gynaecology . . . . .	Miss M. Waite
Hendry Memorial Scholarship . . . . .	I. Lipton
Issei Scholarship in Medicine and Surgery . . . . .	D. A. Dotten
Dr. Louis Kagan Memorial Award . . . . .	J. D. Hunt
Medal of the Consul General of France . . . . .	G. S. Wong
Medical Alumni Association Scholarship . . . . .	Mrs. E. F. M. Borins
Medical Alumni Association Prize . . . . .	D. C. MacGregor
Ellen Mickle Fellowship . . . . .	I. Lipton
Ontario Medical Association Prize in Preventive Medicine . . . . .	Miss I. Z. Beitins
Dr. Roy Simpson Scholarship in Paediatrics . . . . .	D. A. Dotten } M. H. Lipson } <i>Aeq.</i>
Starkman Memorial Scholarship in Medicine . . . . .	I. Lipton

Third Medical Year

Franckel Memorial Award . . . . .	P. D. Sadowski
Charles E. Frosst Scholarship . . . . .	P. D. Sadowski
J. F. Hartz Company Prize in Ophthalmology . . . . .	D. R. Henderson
J. F. Hartz Company Prize in Oto-Laryngology . . . . .	K. Sky
Frank W. Horner Gold Medal in Paediatrics . . . . .	M. Zweig
Samuel Rotman Scholarship . . . . .	J. H. Renouf
Starkman Memorial Prize in Pharmacology and Therapeutics . . . . .	R. Baupal
Starkman Memorial Scholarship in Public Health and Preventive Medicine . . . . .	K. H. Norwich

Second Medical Year

Dr. Frederick James Colling, O.B.E. Memorial Scholarship . . . . .	M. A. Singer
John Copp Bursary . . . . .	H. A. Armstrong
Plaza Drug Store Scholarship . . . . .	M. A. Singer
Posluns Brothers Scholarship . . . . .	M. A. Singer
Sandoz Prize in Pharmacology . . . . .	M. A. Singer

First Medical Year

Starkman Memorial Scholarship in Anatomy . . . . .	S. P. Smith
Dr. C. S. Wainwright Memorial Scholarship . . . . .	M. N. Kroch } F. Simon } <i>Aeq.</i>
John Zoberman Scholarship . . . . .	R. P. Orange

*Second Premedical Year*

Famous Players Canadian Corporation Scholarship	Miss J. J. E. Turley
Fulford Scholarship (No. 4 Canadian General Hospital)	Miss J. J. E. Turley
Modern Medicine of Canada History Prize	V. C. Hatschinski

## ANAESTHESIA

*Under the direction of Professor R. A. Gordon*

The content of the lectures given by the Department to the third year students was somewhat altered during this session. Emphasis was placed on such subjects as maintenance of the airway and ventilation, oxygen therapy, the treatment of respiratory deficiency, care and transportation of the unconscious patient, cardiac resuscitation, and other matters of interest to the general physician. Students in the final year of the postgraduate course received training in clinical anaesthesia for a period of one week during their surgical term, and twelve clinics in clinical anaesthesia.

There were 31 postgraduate students in the Department during the academic session. Of these, nine were registered in the first year of the Diploma course in Anaesthesia, and one in the second year. Postgraduate students have come from the British Isles, China, India, Italy, Korea, the Philippines, and Turkey. Postgraduate teaching in the field of the basic sciences has been carried on in tutorial groups. This form of teaching is proving most satisfactory.

Members of the department have lectured to postgraduate courses in other departments within the Faculty and to the course in Hospital Administration in the School of Hygiene.

The third Dr. Harry Shields Lecture was given on October 13 by Professor R. D. Dripps of the University of Pennsylvania. Dr. Dripps's subject was "A Comparison of Halothane and Cyclopropane."

The Department has been pleased to welcome the following visitors during the year: Professor Kurt Wiemers, Freiburg, Germany; Professor J. Gordon Robson, Wellcome Professor of Anaesthetic Research, McGill University, Montreal; Professor R. G. B. Gilbert, Professor of Anaesthesia, McGill University; Dr. Alan Noble, Anaesthetist-in-Chief, Royal Victoria Hospital, Montreal; Dr. George P. Varky, Department of Anaesthesia, Christian Medical College Hospital, Vellore, India; Professor Gordon Wyant, University of Saskatchewan; Professor Stuart L. Vandewater, Queen's University, Kingston; Professor Horace B. Graves, University of British Columbia; Dr. R. A. Butler, Research Department of Anaesthetics, Royal College of Surgeons, London; Dr. Herbert H. Pinkerton, Anaesthetist-in-Chief, Western Infirmary, Glasgow, Scotland.

Dr. Alan W. Conn and Dr. Rice H. Meredith have been promoted to the rank of Assistant Professors in the Department. In addition, the Department is pleased to welcome Dr. C. M. Kincaide, Dr. R. A. Chaplin, Dr. S. Eisen and Dr. Evelyn Bateman as Clinical Teachers. Dr. J. E. York has worked in the Respiratory Deficiency Unit at the Toronto General Hospital under a Fellowship from the Rehabilitation Foundation for Poliomyelitics and the Orthopaedically Disabled.

In September, 1961, the Department opened a clinical research laboratory in space provided by the Toronto General Hospital. The basic equipment of the laboratory was made possible through a National Health Grant. This laboratory has made possible the planning of investigations which were previously beyond the facilities of the Department.

Dr. Shirley Fleming has been granted leave of absence from the Department and will proceed early in July to Lagos, Nigeria, on a temporary appointment as Professor of Anaesthesia in the Lagos University Medical School, to set up the Department of Anaesthesia.

Dr. R. A. Gordon was elected President of the Academy of Anesthesiology at the Annual Meeting of that body in Salt Lake City, Utah, in October, 1961. Dr. Gordon has also served as President of the Defence Medical Association of Canada and Vice-President of the Canadian Anaesthetists' Society. In addition, Dr. Gordon has served as Consultant in Anaesthesia to the Canadian Forces Medical Council and Editor of the *Canadian Anaesthetists' Society Journal*.

Dr. Iain M. MacKay has been appointed Consultant in Anaesthesia to the Emergency Health Services Division of the Department of National Health and Welfare.

The following lectures and addresses were given outside the University by members of the Department. Dr. A. W. CONN: "Anaesthesia for Surgery of Anomalies of the Aortic Arch" to the Academy of Anesthesiology, Salt Lake City, Utah, September, 1961, and "Anaesthesia for Pyloromyotomy" at the Annual Meeting of the Canadian Anaesthetists' Society, May, 1962. Dr. H. B. F. FAIRLEY: "Diagnosis and Management of Post-operative Respiratory Insufficiency" at the Postgraduate Course in Anaesthesia, Dalhousie University, September, 1961; guest panelist on a Symposium on Respiratory Insufficiency, New York State Society of Anesthesiology, December, 1961; "The Critical Examination of Acid-Base Balance Studies," The Canadian Anaesthetists' Society, May, 1962. Dr. JAMES H. KERR: "An Analysis of Ventilatory Volume in Pregnancy" at the Annual Meeting, The Canadian Anaesthetists' Society, May, 1962. Dr. C. W. P. LUNDERVILLE: "Tarasan in Anaesthesia" at the Annual Meeting, The Canadian Anaesthetists' Society, May, 1962. Dr. I. M. MACKAY: "Anaesthesia for Mass Casualties" to the Physicians Indoctrination Courses at the National Civil Defence College, Arnprior, Ontario, November, 1961, and June, 1962; "Assessment of Audio-Analgesia" at the Annual Meeting, Canadian Anaesthetists' Society, May, 1962. Dr. EDITH ROGOMAN: "The Use of Epinephrine during Halothane Anaesthesia with respect to Ventricular Fibrillation" to the Congress of the International Anaesthesia Research Society at Miami, Florida, April, 1962.

### RESEARCH

Members of the staff have carried out the following projects. Dr. H. B. Fairley has been engaged in establishing basic techniques in the new Clinical Investigation Laboratory.

Dr. R. A. Gordon and Dr. James Kerr have continued the comparative study of four local anaesthetic drugs in epidural anaesthesia for obstetrics which was commenced last year. Dr. R. A. Gordon is continuing a study of the use of regional anaesthetic techniques in the relief of intractable pain.

Dr. James Kerr has been associated with Dr. G. Pearson of the Department of Surgery in an attempt to develop satisfactory anaesthetic and surgical techniques for sleeve resection of the trachea, under a grant from the Ontario Cancer Treatment and Research Foundation.

Dr. Iain M. MacKay has completed a preliminary investigation of the analgesic effects of "white sound" and music, using instruments supplied by Philips Electronics Industries Ltd.

Dr. C. W. P. Lunderville has investigated the usefulness of "Tarasan" in anaesthesia.

Dr. Brian Marshall in association with the Department of Neurosurgery has continued a study of Hypothermia under a National Health Grant.

Dr. Raymond Matthews has continued a study to evaluate the effectiveness of diethyl amide of vanillic acid as an arousal agent in unconsciousness due to drugs, under a grant from Arlington-Funk Laboratories.

Dr. Edith Rogoman in association with Dr. A. E. Johnston and Dr. A. W. Conn has conducted an investigation to determine the effect of epinephrine on the dog heart during Halothane anaesthesia. This work has been financed by the

Research Institute of the Hospital for Sick Children and Ayerst, McKenna & Harrison Ltd.

Dr. Stanley Zeglen in collaboration with Dr. Gordon Hawks, Bacteriologist, St. Michael's Hospital, has investigated the bacterial contamination of anaesthetic equipment and has evaluated the effectiveness of decontamination by several standard methods of cleaning such equipment. This investigation is continuing.

ANAESTHESIA

FAIRLEY, H. B. "The Intensive Care Unit" (*Modern Medicine of Canada*, vol. 17, no. 6, June, 1962, p. 55).  
—— "The Toronto General Hospital Respiratory Unit" (*Anaesthesia*, vol. 16, no. 3, July, 1961, p. 267).  
KERR, J. H. "Bronchopulmonary Resistance in Pregnancy" (*Canadian Anaesthetists' Society Journal*, vol. 8, no. 3, July, 1961, pp. 347-55).  
SMITH, C. "Anaesthesia for Percutaneous Splenoportography in Children" (*Canadian Anaesthetists' Society Journal*, vol. 9, no. 2, March, 1962, p. 109).  
YORK, J. E., CAMPBELL, S. M. and GORDON, R. A. "Evaluation of Phenazocine in Postoperative Patients" (*Canadian Anaesthetists' Society Journal*, vol. 9, no. 2, March, 1962, p. 121).

ANATOMY

Under the direction of Professor J. W. A. Duckworth

During the year 1961-2 there were 1,141 undergraduate and graduate students working in the Department of Anatomy. They were distributed among 33 different courses mentioned below, as follows:

UNDERGRADUATE COURSES IN ANATOMY

1. Medical, first year . . . . .	148
Teachers' Course, Physical and Occupational Therapy . . . . .	2
Art as Applied to Medicine . . . . .	1
2. Medical, second year . . . . .	143
3. Dental, first year . . . . .	120
4. Physical Anthropology, Premedical, first year . . . . .	79
5. Physical Anthropology, Honours course, 3C . . . . .	11
6. Physical and Occupational Therapy, first year . . . . .	95
7. Physical and Occupational Therapy, second year . . . . .	84
8. Physical and Occupational Therapy, third year . . . . .	53
9. Physical and Health Education, second year . . . . .	60
10. Physical and Health Education, third year . . . . .	48
11. Dental Hygiene, first year . . . . .	41
12. Speech Pathology . . . . .	5
13. School of Embalming, first year . . . . .	55
14. School of Embalming, second year . . . . .	52

997

GRADUATE COURSES IN ANATOMY

15. Radiology . . . . .	12
16. Anaesthesia . . . . .	15
17. Neuro-Anatomy . . . . .	20
18. Obstetrics and Gynaecology . . . . .	12
19. Ophthalmology . . . . .	6
20. Otolaryngology . . . . .	14
21. Dental Anatomy . . . . .	7
22. Physical Anthropology, Course 1001 . . . . .	6
23. Demonstrators in Gross Anatomy . . . . .	3
24. Advanced Graduate Course in Surgery (summer) . . . . .	16
25. Advanced Graduate Course in Obstetrics and Gynaecology (summer) . . . . .	12
26. Advanced Anatomy of the Locomotor System . . . . .	9

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UNDERGRADUATE COURSES IN MICROSCOPIC ANATOMY

27. Medical, first year (included in item 1)	148
28. Dental, first year (included in item 3)	120
29. Physical and Occupational Therapy, first year (incl. in item 6)	95

GRADUATE COURSES IN MICROSCOPIC ANATOMY

30. Dental Histology	7
31. Histology	4
32. Special Cytology	1

	12
TOTAL	1141

During the session 1961-2, the number of students attending courses in the Department increased by 205 to an over-all total of 1,141.

Two new courses were introduced. The first was designed for graduate doctors and physiotherapists interested in the Advanced Anatomy of the Locomotor System. This course was organized and given by Dr. M. C. Hall. The second course was designed to give second, third and fourth Medical year students a revision of the anatomy of the human body and was orientated towards the clinical application of their anatomical knowledge. This course was conducted on a voluntary basis at 5:15 p.m. on Monday evenings and proved to be extremely popular, attendance being in the region of 200-300 students.

This year was the first time that the combined Neuro-Anatomy and Neuro-Physiology course was held in the second Medical year, whilst the General Physiology in the first Medical year was increased. It is too early to assess the advantages and disadvantages of these changes, but the students found the first Medical year a heavy load, containing as it does the whole of Histology and Biochemistry and with the exception of the Neuro-Anatomy and Neuro-Physiology, practically the whole of Gross Anatomy and Physiology. The stress they were under showed itself in a marked falling off in their attendance for the week prior to any of their examinations.

During the year, the following papers were presented. Dr. J. E. ANDERSON: Two lectures on Paleopathology at the University of Toronto Archaeological Field School at Cahiaque during July; "Physical Anthropology of the Iroquois" at the Conference on Iroquoian Studies, McMaster University, Hamilton, October, 1961; "The Pattern of Bone Involvement in Osteoarthritis" at Queen's University, Kingston, March, 1962. "A Population Study of Degenerative Bones Changes" at the annual meeting of the American Association of Physical Anthropologists, Philadelphia, April, 1962; "Current Problems in Physical Anthropology" to the Physical and Health Education Alumni Association, Toronto, May, 1962. Dr. M. C. HALL: "Changes in Articular Cartilage resulting from Alterations of Joint Function," The Canadian Federation of Biological Societies, Quebec, June, 1962. Dr. T. S. LEESON: "The Fine Structure of the Developing Trachea" to the Burton Society of Electron Microscopists, October, 1961; "The Nature and Function of the Tunica Vaginalis Testis" to the Burton Society of Electron Microscopists, February, 1962; "The Fine Structure of the Pectinate Ligament in Normal and Glaucomatous Eyes" to the Anatomy Department, Queen's University, February, 1962; "Medical Students in Great Britain" to the Women's Medical Athletic Association, February, 1962; "The Nature and Function of the Mammalian Tunica Vaginalis Testis" to the American Association of Anatomists, 75th Session, Minneapolis, March, 1962; "The Pathogenesis of Chronic Simple Glaucoma" to the Ophthalmology Research Group, Toronto, April, 1962; "The Pectinate Ligament in Normotensive and Glaucomatous Eyes" to the Faculty of Medicine, University of North Dakota, April, 1962; "The Fine Structure of the Rete Testis" to the Burton Society of Electron Microscopists, June, 1962; "The Rete Testis by Electron Microscopy" to the Canadian Federation of Biological Societies, June, 1962.

## RESEARCH

Dr. J. E. ANDERSON extended his data on growth during adolescence in Canadian children by the study of groups at University Settlement House, St. Christopher House, Onondaga Camp and at Trinity College School. These observations are being continued.

He has also completed the study of the skeletons from a thirteenth-century Iroquois village consisting of 512 individuals. A distinctive assemblage of genetic anomalies was found in this inbreeding population. A detailed study of osteoarthritic changes in these skeletons show that: (*a*) there is a typical appearance of the bone lesions for each joint, (*b*) there is a marked difference in the incidence of arthritis in the various joints of the body, (*c*) the two bones forming part of the same joint show considerable difference in the incidence and severity of the disease.

The final draft of a manual of osteology has been completed by Dr. Anderson, and will be published in mid-July.

Dr. SYLVIA H. BENSLEY, with the aid of a grant from the Banting Research Foundation, is carrying out long-term serial studies of the systemic effects of colchicine on mice, with special reference to fibroblastic proliferations, relation of mast cells to ground substance, fibrogenesis and tumorogenesis. Some of the early changes in the living iris following intraperitoneal injections of colchicine have been recorded by cinephotomicrography. Initial results indicate that tumorogenesis appears to be incidental to rather than directly due to the systemic effects of colchicine.

In conjunction with Dr. John Birch, she has carried out histochemical studies on the fate of collagenic fibres in unsutured autologous flexor tendon grafts. In the traumatized portions of the grafts, the original collagenic fibres disappeared and were rapidly replaced by proliferating gap tissue in which new fibres were laid down and, later, matured into tendon fibres. In the non-traumatized portions of the graft, the surviving collagenic fibres became repopulated with cells and the original fibres were reconstituted.

Dr. M. C. HALL has concentrated his research on the experimental production of degenerative joint changes, with a view to forming an experimental model for the examination of the changes that occur in the human.

Studies involving joint immobilization have shown that cartilage will atrophy and degenerate when not used and that it will increase in thickness according to increased demands made upon it, as long as a potential for growth remains in the tissue.

Studies involving the destruction of the nerve supply to joints, to inhibit the normal protective reflexes preventing maluse, have shown that a gradual degeneration occurs. This method enables fine alterations to be followed.

Studies involving removal of muscle groups, causing an abnormal range of movement or, by blocking the movement of one joint, an abnormal range in the joints above and below, produced changes similar to those occurring in osteoarthritis not due to disease or direct injury to the joint involved.

He has continued his microradiographic studies of articular cartilage and has found definite changes in the physical density of the cartilage in osteoarthritis. These changes have been correlated with changes demonstrated by colour staining. Methods of "staining" the cartilage with metal to show areas of differential density to X-rays were developed which also confirmed these findings.

He has investigated the water binding power of animals treated with papain and of animals deficient of vitamin A. The former substance, a protein-breaking enzyme was used to try to evaluate the importance of the protein component of the intercellular substance in the function of water binding. The latter substance has been thought to have some influence over the production of the mucopolysaccharides of connective tissue. The above experiments are not yet complete and are being continued.

Finally, he has investigated the trabecular structure of human bone in order to find out information in regard to the forces acting across a certain joint and the etiology of certain fractures.

Dr. T. S. LEESON has investigated the fine structure of the extracellular material in the pectinate ligament of the human eye in chronic simple glaucoma.

In conjunction with Dr. L. Adamson, he has carried out a histological and electron microscopic investigation of the tunica vaginalis of the testis. His investigations indicate that the tunica vaginalis has a complete visceral layer. Following injections of india ink they found that particles appeared within vesicles in the mesothelium within two minutes and in macrophages deep to the mesothelium within five minutes of the injection.

He has also investigated the rete testis in the rat.

#### ANATOMY

- ANDERSON, J. E. "The Development of the Tympanic Plate" (*Contributions to Anthropology*, National Museum of Canada, Ottawa, 1961, pp. 143-53).
- "The Montgomery and Boyle Osteology Collections" (*1961 Annual Report, Art and Archaeology Division, Royal Ontario Museum, University of Toronto*, pp. 67-70).
- ANDERSON, J. E. and MERBS, C. F. "A Contribution to the Human Osteology of the Canadian Arctic" *Art and Archaeology Division, Royal Ontario Museum, Occasional Paper No. 4*, 1962, pp. 65-94).
- BENSLEY, SYLVIA H. "Microscopic Studies on Living Connective Tissue" (*Proceedings of the Second Canadian Conference on Research in Rheumatic Diseases*, Oct. 28-9, 1960, pp. 185-91).
- HALL, M. C. "Cervical Spondylosis" (*Journal of the Canadian Physiotherapy Association*, vol. 13, Dec., 1961, pp. 189-94).
- "Changes in Articular Cartilage Resulting from Alteration of Joint Function" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 5, 1962, pp. 33-4).
- "Changes in Loose Connective Tissue in the Male Rat Following Castration" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 10, Oct., 1961, pp. 1531-3).
- "The Effect of Hypophysectomy in Retarding the Ageing Process of Loose Connective Tissue in the Rat" (*ibid.*, pp. 1525-9).
- "A Method of Forming Standard Gellatinous Bullae in the Subcutaneous Tissue of the Rat and the Use of These Bullae in Comparing the Physical and Histological Characters of Connective Tissue" (*Proceedings of the Second Canadian Conference on Research in Rheumatic Diseases*, Oct. 28-9, 1960, pp. 198-9).
- "Radiographic Examination of the Lateral Femoral Condyle in Relation to the Etiology of Recurrent Dislocation of the Patella" (*Clinical Orthopaedics*, vol. 24, Chap. 16, 1962, pp. 161-3).
- "The Trabecular Patterns of the Neck of the Femur with Particular Reference to Changes in Osteoporosis" (*Canadian Medical Association Journal*, vol. 85, no. 21, Nov. 18, 1961, pp. 1141-4).
- "The Variation with Body Weight of the Water Binding Properties of Common Connective Tissue" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 10, Oct., 1961, pp. 1535-42).
- LEESON, T. S. "The Development of the Trachea in the Rabbit, with Particular Reference to the Fine Structure" (*Anatomischer Anzeiger*, vol. 110, Dec., 1961, pp. 214-23).
- LEESON, T. S. and ADAMSON, L. "The Nature and Function of the Mammalian Tunica Vaginalis Propria Testis" (*Anatomical Record*, vol. 142, Feb., 1962, p. 252).
- LEESON, T. S. and KALANT, H. "Effects of In Vivo Decalcification on Ultrastructure of Adult Rat Liver" (*Journal of Biophysical and Biochemical Cytology*, vol. 10, May, 1961, pp. 95-104).
- LEESON, T. S. and SPEAKMAN, J. "Changes in the Fine Structure of the Pectinate Ligament of the Eye in Simple Glaucoma" (*Anatomical Record*, vol. 142, June, 1962, p. 315).
- "The Fine Structure of Extracellular Material in the Pectinate Ligament (Trabecular Meshwork) of the Human Iris" (*Acta Anatomica*, vol. 46, Dec., 1961, pp. 363-79).
- "Pathogenesis of Raised Intraocular Pressure in Chronic Simple Glaucoma" (*Nature*, vol. 193, no. 4816, Feb., 1962, pp. 694-5).
- SMITH, C. G. *Basic Neuroanatomy*. Toronto: University of Toronto Press. 1961. Pp. 257.

## ART AS APPLIED TO MEDICINE

*Under the direction of M. T. Wishart*

The Department of Art as Applied to Medicine enjoyed a busy session in 1961-2.

Miss E. Blackstock assisted Dr. J. S. Speakman and Dr. T. S. Leeson in designing and executing an exhibit of eight panels entitled "Pathogenesis of Obstruction to

Aqueous Outflow in Chronic Glaucoma," shown at the meeting of the American Medical Association, June, 1962. Miss Blackstock interpreted the work, as shown in light and electron photomicrographs with graphic three dimensional colour cutout illustrations.

In addition to this exhibit a considerable number of illustrations were carried out for other members of the Department of Ophthalmology: Miss E. Blackstock, "Management of Retinal Detachment," for Dr. M. Shea; Miss E. Blackstock and Mrs. J. R. Ross, "Complications of Retinal Surgery," for Dr. M. Shea; Mrs. D. Bosomworth, preliminary sketches and layout of a proposed Canadian pamphlet, for the general public, on Glaucoma, for Dr. W. R. F. Luke.

Miss Wishart assisted by Mrs. Joanne Bosomworth, third year student in Art as Applied to Medicine, continued experiments in the applicability of epoxy and polyester rezins, silastic and silicone rubbers in the making of three dimensional models concentrating especially on L.T.V. 602. This is a General Electric Company clear clotting silicone compound which offers exceptional advantages, being light in weight, transparent as glass, having a sensitive tactual quality and a facility in the repairing or replacing of a defected part curing completely clear with no evidence of repair. Subject-matter for the experiments was provided by the making of a clay model of the human heart demonstrating homograft replacement of the human mitral valve by an aortic valve transplanted from another patient as performed by Dr. Ray Heimbecker of the Department of Surgery, Cardiac Division.

Miss Wishart attended a mid-year meeting of the Council on Education of the Association of Medical Illustrators, held in Washington, D.C., in May, to discuss a standard of teaching for courses in medical illustration.

Upon my retirement at the end of the present session Miss N. G. Joy will succeed me as Director. I will follow the growth of the department under her guidance, especially the teaching branch, with keen interest, and I wish Miss Joy every success.

I am sincerely and deeply pleased that the teaching branch of the Department is to be continued and that, relative thereto, I can report an increase this year in the number of inquiries about the course of over 50 per cent, also five to seven students enrolled at Art School taking the required basic training preparatory to entering the course.

Finally I wish to remark on the very real pleasure it has been to work with Miss Blackstock, who has been my co-worker for the last fifteen years.

## BACTERIOLOGY

*Under the direction of Professor Philip Greey*

The undergraduate teaching has continued with minor modifications during the past year. Postgraduate instruction was given to the residents in Otolaryngology, Ophthalmology, Internal Medicine and Pathology.

### RESEARCH

Dr. R. M. Price has continued her interest in the prophylactic vaccination against tuberculosis, and the study of atypical strains of acidfast bacilli isolated from human sources.

Dr. G. H. Hawks, at St. Michael's Hospital, is determining the sensitivity to penicillin of recently isolated strains of gonococci. He is also investigating the presence of autoantibodies in thyroid disease using the tanned red cell technique and has studied the bacterial population found in the various items used in anaesthetic equipment with methods to reduce the size of the flora.

Dr. Marion Ross, at Sunnybrook Hospital, with the Department of Surgery, has completed a study showing that hibitane is of value in the prevention of post-

operative infections following prostatectomy. Its use for this purpose has become a standard procedure for the Urological Service. She has also reassessed the various tests devised to indicate the potential pathogenicity of strains of staphylococci. A test employing fibrinogen agar and soya bean trypsin has been found to be easy to perform, rapid and more reliable than the standard tube coagulase test.

Dr. T. E. Roy, at the Hospital for Sick Children, has completed studies on the transduction of antibiotic resistance with staphylococci. Bacteriophages derived from tetracycline-resistant staphylococci can transfer the resistance to sensitive strains. He has prepared for publication the findings of an investigation of all hospital infections encountered during one year. This was one of the most complete studies undertaken, requiring the services of two full-time nurses, numerous ancillary personnel, punch cards and IBM machines.

Miss Joan Hennessy with Dr. W. B. Spaulding, Department of Medicine, has continued to collect specimens of lymph node pus from patients with cat scratch disease and also to collect acute and convalescent phase blood sera. Efforts to grow a virus from both lymph node material and acute phase sera are being continued in tissue culture cells including HeLa, transformed rabbit lymph node and freshly prepared chick embryo cells, with emphasis on cells grown and maintained in media without antibiotics. All pus samples have been cultured on appropriate media at body and room temperatures for three months with negative results for atypical *Mycobacteriaceae*. After tests had shown no alteration of antigenicity, lymph node material for human skin testing is now prepared by heating at 60° C for ten hours to eliminate the possibility of transferring the agent of homologous serum hepatitis. Laboratory investigations have been conducted on the latest penicillins. Studies have commenced on the use of the fluorescent antibody technique. In collaboration with Dr. J. M. Findlay, Department of Medicine, bacteriological studies have continued on patients attending the gastroenterological unit. The preliminary results are that a high percentage of patients with secondary steatorrhoea grow coliform organisms from specimens aspirated from the upper gastrointestinal tract. Ten of eleven such patients showed improved digestion and absorption when treated with specific antibacterial therapy.

Dr. A. E. Franklin has continued studies on the propagation and adaptation of viruses to tissue culture cell lines which have been grown continuously in the presence of hormones. Cell lines under investigation include HeLa (human carcinoma of the cervix), Hep-2 (human epidermoid carcinoma), human adult heart, monkey heart, J-111 (human monocytic leukemia) and human embryonic intestine. Prednisolone acetate and progesterone are added to the media of some of these cell lines. Viruses used in this study include poliovirus-1, Coxsackie A6, A7, A9, A16, B5 and B6; Herpes simplex; specimens from patients with infectious hepatitis and serum hepatitis. Poliovirus-1 and Coxsackie B5 viruses have been titrated at regular intervals in many of these cell lines. HeLa cells which have been grown continuously in the presence of prednisolone acetate for almost three years continue to indicate some alterations in the host-virus relationship, both in titration values and the ability to adapt some of the viruses under study. Hep-2 cells are more sensitive to most of these viruses. All viruses in this series, except the specimens from hepatitis cases, have been adapted to one or more of the cell lines. Other workers have found that Coxsackie B6 only could be propagated in monkey kidney cells, but it has adapted easily to all cell lines. Coxsackie A6 has been reported to not grow in any tissue culture cell line, but a cytopathogenic effect has been obtained in HeLa, Hep-2 and human adult heart with and without hormones. In confirmation of our previous results, many adaptations have occurred more rapidly in cultures which have been grown continuously in the presence of prednisolone. The agents of infectious and serum hepatitis have failed to produce a cytopathogenic effect under these conditions. A transmissible cytopathogenic effect which was obtained from an acute stage infectious hepatitis specimen on three separate occasions in human adult heart cultures could not be confirmed in subsequent experiments, and furthermore, the

agent isolated was inactivated at temperatures incompatible with the known thermostability of the hepatitis viruses.

Dr. J. C. Sinclair and his associates, Miss B. K. Buchner, M.A., and Mrs. L. Shreeve have continued research in the hepatitis field. Preliminary studies have been undertaken utilizing the O'Malley technique for assessing the antibody content of sera from serum hepatitis patients. Studies of specimens from infectious hepatitis patients also have been attempted employing Davis's cell line of human embryo lung. In eleven epidemics of infectious hepatitis over a three-year period, the prophylactic value of gamma globulin has been studied. It is significant that of the more than 3,200 persons receiving gamma globulin, who were close contacts of 1,837 infectious hepatitis patients, only 16 of those subsequently developing jaundice could be classed as true failures in protection. Gamma globulin, when given in a dose of 0.02 cc/lb body weight within two weeks of exposure therefore would appear to be highly effective.

BACTERIOLOGY

FINLAY, J. M., MORTIMER, D. C., REED, P. I., GREY, P. H. and HENNESSY, J. N. "The Role of the Upper Gastrointestinal Flora in the Malabsorption Syndrome" (*Programme, 31st Annual Meeting, Royal College of Physicians and Surgeons of Canada*, Jan. 19, 1962, pp. 21-22).

GREY, P.H. "Antibiotics 1961" (*Hospital Pharmacist*, vol. 15, Jan.-Feb., 1962, pp. 16-20).

——— Review, *Canadian Medical Association Journal*, vol. 85, no. 20, Nov. 11, 1961, p. 1123.

SMYTHE, C. A. and ROSS, MARION "Chlorhexidine (Hibitane) as a Skin Preparation for Surgery—A Preliminary Report" (*Medical Services Journal, Canada*, vol. 17, no. 8, Sept., 1961, pp. 571-4).

BIOCHEMISTRY

*Under the direction of Professor C. S. Hanes*

During the past year 404 students have received instruction in the Department of Biochemistry, the distribution being as follows:

Faculty of Medicine (1st Med. year)	146
Faculty of Dentistry (1st year)	119
Faculty of Arts, third year honour courses	43
fourth year honour courses	12
Faculty of Household Science	2
Graduates Enrolled as Special Students in Faculty of Arts & Science	14
School of Graduate Studies	68
(a) Major Subject Biochemistry	13
Candidates for Ph.D.	9
Candidates for M.A.	4
(b) From other departments	48
(c) Special Students	7
TOTAL	404

One feature, which reflects a trend noticeable during recent years, is the increased number of graduate students from other departments who are attending courses of instruction in Biochemistry. Consideration is being given to the desirability of providing a comprehensive course of lectures designed specially to meet the needs of these students. Another indication of the increasingly widespread interest in biochemical concepts and methods is the growing number and variety of consultations between members of this department and of other departments, particularly regarding biochemical aspects of clinical problems. From these contacts, there arise many interesting opportunities for collaborative work—more, in fact, than can be embarked upon with our existing staff and responsibilities.

As in recent years the Department has collaborated in giving a course in June on clinical applications of radioactive isotopes, under the aegis of the Division of

Postgraduate Medical Education. Dr. M. A. Packham has again been responsible for organizing the Department's contribution to this course.

During the year we have enjoyed visits from Dr. E. Margoliash of McGill-Montreal General Hospital Research Institute and Professor D. C. Tosteson of Duke University, North Carolina (both sponsored by the School of Graduate Studies) and from Dr. P. N. Campbell of the Courtauld Institute of Biochemistry, of The Middlesex Hospital Medical School (who came to address the University of Toronto Physiological Society at the invitation of Professor Charles H. Best). On these occasions, lectures by our guests in their special fields of interests as well as seminars and informal laboratory discussions proved to be most profitable and stimulating. Dr. J. C. Porter, Head, Division of Chemistry and Biochemistry of the Toronto General Hospital, gave a series of four lectures in this department on the validity of biochemical criteria in clinical diagnosis.

Members of the Department of Biochemistry contributed ten lectures and papers at congresses, symposia and other scientific gatherings during the year.

### RESEARCH

Members of the Department have received generous grants in aid of research from the National Research Council of Canada, the Medical Research Council of Canada, and the J. P. Bickell Foundation.

Professors G. E. Connell, G. H. Dixon and O. Smithies (now at the University of Wisconsin) have continued their joint investigation of the genetics and chemical structure of human haptoglobin. They have completed a study of the inheritance of newly discovered genetic types of haptoglobin, and have made progress in identifying their structural differences. It appears that two polypeptides which are genetically homologous may be quite different in structure and in molecular size.

In Professor Connell's laboratory, Mr. L. Kalutich continued his work on the purification of the enzyme cholinesterase from human serum. He has purified the enzyme approximately 4,000-fold, using several different procedures. Mr. M. Freedman has commenced an investigation of the chemistry of gamma-globulins of low molecular weight. Dr. Connell has undertaken a study of the proteins of saliva in collaboration with Dr. R. C. Burgess of the Faculty of Dentistry.

In Professor B. F. Crocker's laboratory, Dr. Albert Hercz has continued his studies of the mechanism of action of the inducing galactoside in the formation of  $\beta$ -galactosidase in *E.coli* and, in particular, the stimulating effect of very low concentrations of glucose on this process.

Structural studies on proteins have continued to form the main theme of the work in Professor G. H. Dixon's laboratory. Mr. P. Aston has studied the cleavage of the insulin molecule by sulphite and has prepared and characterized some fluorescent derivatives of insulin. In collaboration with Drs. Wilson and Wardlaw, Professor Dixon has prepared some hybrid insulins (cod fish-bovine) and has examined their biological potency and immunological specificity. Sequence analysis of cod fish insulin is now in progress. Dr. H. Schachter, an M.R.C. fellow, has continued his work on the structure of chymotrypsin and trypsin, and has isolated and purified a series of peptides from the active site of chymotrypsin which differ only in the state of oxidation of their methionine residues. He has been able to label these methionine residues with  $C^{14}$  and to show that the photo-oxidation of one of them results in the loss of enzymatic activity. Dr. Schachter has completed also a survey of the proteins in normal meconium and in meconium from patients with meconium ileus and has shown that the presence of several serum proteins in large amounts is peculiar to the pathological meconium. He has isolated and purified mucoproteins from both normal and abnormal meconium and has observed differences in their amino-acid and carbohydrate composition.

The investigation of the effects of insulin on the metabolism and electrolytes of frog muscle by Professor J. Manery Fisher and Mrs. E. Dryden has revealed

interesting differences between this tissue and mammalian muscle. This led to comparative studies of the glucose metabolism in certain tissues of the frog and the rat. Large seasonal fluctuations were found in the glucose concentrations in frog plasma, also the activity of glucose-6-phosphatase in frog liver was much lower than in rat liver. Frog muscles utilized lactic acid more rapidly than glucose; in this characteristic, and in the insulin effect on electrolyte movement, this tissue differs from mammalian skeletal muscle.

Mrs. Colleen Dunkley has commenced a study in Professor Fisher's laboratory of the mechanisms underlying the movement of phosphorus compounds across the membrane of the muscle fibre. Using radioactive orthophosphate she has shown that insulin stimulates a net uptake of phosphate by frog muscle. Continuing his investigations of the lens of the rabbit eye, Mr. Y. K. Ma'tuk has shown that adenosine triphosphate reverses the cation shifts which occur during anaerobiosis. He is now beginning a study of enzymes in the lens membranes which might control the movement of cations. Mr. I. W. French has studied the effects of aldosterone on the tissue electrolytes of normal and adrenalectomized rats, maintained on various salt loads. The data suggest that, in the whole animal, the hormone influences the sodium pump in skeletal muscle and the study is now being extended to isolated muscle.

In Professor Hanes's laboratory Mr. J. T. Wong has continued his studies on kinetic theory applicable to enzymes which act upon two substrates. He has now completed an experimental study of liver alcohol dehydrogenase which demonstrates the manner in which the new generalized theory can be used to deduce features of enzymic mechanisms from appropriate kinetic data. Mr. Ross Donovan, in his investigation of the enzymic degradation of elastin, has demonstrated that pancreatic elastase contains at least two component enzymes in addition to a cofactor, apparently protein in nature, the presence of which under appropriate conditions increases greatly the dissolution of elastin by one of the enzymes.

Mrs. Solveig Bjerre and Professor Hanes have continued the investigation of the renal aminopeptidase studied previously in this laboratory by Drs. Matheson, Webb, and Sampath Kumar. The combined results show that this is a non-specific peptidase which may exist in a number of conjugated forms, of which certain differentiating characteristics, including kinetic properties, have now been established.

Professor R. K. Murray, in association with Professor Connell, concluded his study of hemoglobin metabolism in the rabbit and the physiological role of haptoglobin which binds hemoglobin. He showed that the binding with haptoglobin had pronounced effects on the rate of clearance of hemoglobin from plasma, and on the rate of conversion of hemoglobin to bile pigments. Professor Murray has begun a programme of studies on glycoproteins.

Professor G. R. Williams is continuing his investigations of the kinetics of biological oxidations. The reaction between ferrocytochrome c and hydroquinone has been studied in some detail and the results indicate that the reaction involves electron transfer from the ionised form of the quinol; it seems unnecessary to postulate special steric requirements for this transfer to occur. An investigation of the kinetics of the reactions comprising the Krebs' cycle has been begun but has been confined so far to certain problems of tracer technique and theory.

Two graduate students in the Department of Biochemistry completed their work for the Ph.D. degree and presented theses as follows: M. A. Moscarello, Some biochemical studies related to the growth of tumour cells; R. K. Murray, The role of haptoglobin in haemoglobin metabolism.

#### BIOCHEMISTRY

CONNELL, G. E., DIXON, G. H. and SMITHIES, O. "A Genetic Difference in Human Haptoglobin Which is not a Single Aminoacid Substitution" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 5, 1962, p. 168).

- "Subdivision of the Three Common Haptoglobin Types Based on 'Hidden Differences' " (*Nature*, vol. 193, no. 4814, Feb. 3, 1962, pp. 505-6).
- CONNELL, G. E., MOORE, B. P. L., PARTINGTON, M. W. and WALKER, N. F. "Phenylketonuria in One of Twins" (*University of Toronto Medical Journal*, vol. 39, 1962, pp. 257-64).
- DIXON, G. H., CONNELL, G. E. and SMITHIES, O. "Chemical Studies on Genetic Variates of Human Haptoglobin" (*Federation Proceedings*, vol. 21, no. 2, 1962, p. 408).
- FRENCH, I. W. and MANERY, J. F. "The Effect of Aldosterone on Tissue Electrolytes" (*Federation Proceedings*, vol. 21, no. 2, 1962, p. 186).
- MOSCARELLO, M. A., LANE, B. G. and HANES, C. S. "Quantitative Chromatographic Methods, Part 8: Chromatographic Systems of High Resolving Power for Nucleotides" (*Canadian Journal of Physiology*, vol. 39, no. 11, 1961, pp. 1755-64).
- SCHACHTER, H. and DIXON, G. H. "Studies on S-Sulphochymotrypsin labelled DFP<sup>32</sup>" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 5, 1962, p. 165).
- SMITHIES, O., CONNELL, G. E. and DIXON, G. H. "Inheritance of Haptoglobin Subtypes" (*American Journal of Human Genetics*, vol. 14, 1962, pp. 14-21).
- WILSON, S. and DIXON, G. H. "A Comparison of Cod and Bovine Insulins" (*Nature*, vol. 191, no. 4791, Aug. 26, 1961, pp. 876-9).
- WONG, J. TZE-FEI and HANES, C. S. "Kinetic Formulations for Enzyme Reactions Involving Two Substrates" (*Canadian Journal of Biochemistry and Physiology*, vol. 40, no. 6, 1962, pp. 763-804).

## COMMITTEE ON EXPERIMENTAL RESEARCH

*Chairman:* Dr. John Hamilton

*Reported by* Dr. Harold Baer

Twenty-nine researchers have made use of the Committee's facilities in the past year (compared to twenty-six researchers in the previous year).

The number of operations performed were similar:

July, 1960, to June, 1961—total 796; average per day—3.5.

July, 1961, to June, 1962—total 748; average per day—3.1.

Animals placed under the care of the Committee included: dogs, rabbits, squirrels, cats, guinea pigs, monkeys, hamsters, mice, rats, pigeons and groundhogs. Of these, dogs and rabbits were the most numerous. Numbers purchased: (a) Dogs—July, 1960, to June 1961—693; July, 1961, to June, 1962—875 (an increase of 26 per cent over the previous year). (b) Rabbits—July, 1960, to June, 1961—464; July, 1961, to June, 1962—739 (an increase of 59 per cent over the previous year).

Improvements made in 1961-2 included: (a) the construction of a separate office cubicle for the secretary, and a combined office-laboratory for the veterinarian; (b) the building of an enlarged darkroom, and better X-ray and storage facilities; (c) the purchase of surgical instruments, and of an electrosurgical unit; (d) continuation of construction of a room for the boarding of cats, and of a small isolation area for sick animals on the sixth floor; (e) air conditioning of one animal room, and the installation there of a terrazo floor.

A number of infectious conditions were diagnosed in the past year. These included distemper, infectious hepatitis and tracheobronchitis in dogs; feline panleucopenia and pneumonitis in cats; and ringworm, hepatic and intestinal coccidiosis in rabbits.

Outbreaks of these conditions show the great need for adequate space for the isolation of freshly brought in animals, and for the treatment (wherever possible) of affected animals boarded with the Committee. Also, as the requests for increased numbers of animals to be taken care of will likely continue in the coming years, additional space will need to be found.

## MEDICAL BIOPHYSICS

*Under the direction of Professor A. W. Ham*

*Undergraduate Teaching.* Professor Johns gave a substantial part of the course in Physics given to premedical students. Professor Till gave Physics 18 to P. & B. students. Professor Siminovitch gave three lectures in Virology to the Diploma course in Virology in the School of Hygiene. Professor McCulloch was again in charge of the course in Clinical Microscopy given to second year medical students.

*Graduate Teaching.* Last year 20 registered graduate students worked in the Department; one of these is enrolled and working toward the new degree of Doctor of Clinical Science which has recently been made available by the School of Graduate Studies for suitable graduates in Medicine. The other graduate students are enrolled for M.A. or Ph.D. degrees. In addition several post-doctoral fellows pursued research studies in the Department.

A total of 30 graduate students are enrolled for next year.

Graduate courses were given in the Physics and Chemistry of Virus Action, in Immunochemistry, and in Radiobiology. For these courses 10, 8, and 8 students respectively registered.

*Postgraduate.* In the advanced graduate course given by the Division of Postgraduate Medical Education, Professor McCulloch gave two lectures and ten demonstrations, and Professor Axelrad gave two lectures. Professors Bruce and Till each gave five lectures to the Diploma course in Radiology.

*Outside Lectures Delivered.* Members of the staff delivered lectures and/or papers as follows. Professor AXELRAD on "Recent Findings of Virus Leukemia in Mice," University of Ottawa, Ottawa, Ontario, and McGill University, Montreal, P.Q.; on "Genes, Chromosomes, and Antigens in the Evolution of Malignant Cell Populations," Annual Meeting, Royal College of Physicians and Surgeons, Toronto, Ontario; and with H. C. Van der Gaag on "Effect of X-irradiation on Susceptibility to Lymphoma Induction by Gross' Passage A Virus in Adult C3H<sub>1</sub>/Bi Mice: Relation to Thymic Cell Multiplication and Differentiation" Annual Meeting of the American Association for Cancer Research, Atlantic City, N.J. Professor CINADER on "Perspective and Prospects of Immunotherapy: Autoantibodies and Acquired Immunological Tolerance" at Fifth Canadian Cancer Research Conference, Honey Harbour, Ontario; and on "The Effect on Immunogenicity of Acquired Immunological Tolerance," Royaumont, France. Dr. I. DORFMAN with Professor A. W. HAM on "The Liver Lesions that Develop in Hamsters Infected with Polyoma Virus," Annual Meeting Federation of American Societies for Experimental Biology (Pathology), Atlantic City, N.J. Professor HELLEINER on "The Synthesis of DNA by Strain L Mouse Fibroblasts," Physiology Department, McGill University, Montreal, P.Q.; with Mr. Gold on "The Effect of Ionizing Radiation on the Level of DNA-Synthesizing Enzymes in Strain L Mouse Fibroblasts," at the First International Biophysical Congress, Stockholm, Sweden; on "Changes in DNA-polymerase in Synchronized Cultures of Strain L Mouse Fibroblasts" at the 5th Annual Meeting of the Canadian Federation of Biological Societies, Laval University, Quebec, P.Q. Professor HOWATSON on "Recent Advances in Fine Structure" and on "Structure and Development of Vesicular Stomatitis Virus" at the Annual Meeting of the Electron Microscope Society of America, Pittsburgh, Pa.; on "The Architecture of Viruses" at Queen's University, Kingston, Ontario; on "The Structure and Development of Viruses as Revealed by the Electron Microscope" at the Annual Meeting of the Royal College of Physicians and Surgeons, Toronto, Ontario; and on "The Development and Architecture of Tumour Viruses," at the Annual Meeting of the Federation Societies, Atlantic City, N.J. Professor JOHNS on "Some Aspects of Biology at the Molecular Level as seen by a Physicist" at the Winter Clinic Day, Academy of Dentistry, Toronto; on "Caesium<sup>137</sup> and Co<sup>60</sup> Teletherapy" and on "Determination of Tumour Dose in Rotation Therapy with Co<sup>60</sup>" at the 7th Inter-American Congress of

Radiology, São Paulo, Brazil; on "Macromolecular Coding the Basis for Heredity" at the Annual Meeting of the Canadian Association of Physicists, Hamilton, Ontario; Dr. JOHNS was the Canadian Representative to a two-week meeting of the Main Commission of the International Commission on Radiological Units, Montreaux, Switzerland. Professor McCULLOCH on "Viral Carcinogenesis" at the Annual Meeting of the Royal College of Physicians and Surgeons of Canada, Toronto, Ontario; on "Viruses and Their Relationship to Cancer" at the Cancer Symposium of the Allan Blair Memorial Clinic, Regina, Saskatchewan; on "Increased Uses of Radiation Developed in Last Half Century—Why Levels of Radiation are Important to People—The Killing Effects of Radiation upon Cells—The Leukemogenic Effects of Radiation" at the Biological Society, Queen's University, Kingston, Ontario. Professor SIMINOVITCH on "Chemical Bases of Heredity" at the Annual Meeting of the Royal College of Physicians and Surgeons, Toronto, Ontario; and with Professor AXELRAD on "Cell Interactions *in vitro*: Their Relation to Differentiation and Carcinogenesis" at the Fifth Canadian Cancer Research Conference, Honey Harbour, Ontario. Professor WHITMORE on "Neutron and X-irradiation Studies on Mammalian Cells *in vitro*" at Biology Division, Atomic Energy of Canada Limited, Chalk River, Ontario. Dr. M. G. WILLIAMS on "Histochemical Electron Microscope Observations of Verruca Vulgaris" at the Annual Meeting of the Canadian Medical Association, Canadian Dermatologists Association, Montebello, P.Q.

#### RESEARCH

The research work of the Department entailed a great deal of collaboration between different members and was conducted along three main lines: (1) Cell and Radiation Biology; (2) Studies on Virus and Tumours; and (3) Immunology and Immunochemistry.

##### *Cell and Radiation Biology*

Professors Whitmore and Till have shown that irradiating mammalian cells growing in tissue culture results in their not beginning a new cycle of division as soon as they would have normally. They found also that the length of the delay in the mitotic cycle is related to the time in the cycle in which the cell is irradiated, it being shortest if the cell is irradiated in the pre-DNA duplication stage and longest if irradiated in the post-DNA duplication stage.

Mr. Mak, with Professor Till, has shown that if a cell is irradiated *in vitro* during the time in the mitotic cycle when DNA duplication is occurring, the rate of DNA synthesis is reduced for a period of a few hours afterward.

Dr. D. O. Schneider and Professor Whitmore studied the effects of neutrons and X-rays on mammalian cells and found that neutrons are approximately 2.5 times more efficient than X-rays in producing cell death, chromosome breaks, and delays in mitosis. In passing through a limited volume of tissue, neutrons produce many more ionizing events than X-rays. Hence, the fact that neutrons are more effective than X-rays suggests that the lesions mentioned above require several ionizations in a limited volume. The evidence suggests that this limited volume may be the chromosomes.

Although the effects of neutrons and X-rays are different as described above, Professors Bruce and Whitmore have found that the effects of the same absorbed dose of X-rays or electrons in the range from 20 Kev to 20 Mev varies by less than 15 per cent.

Professors McCulloch and Till have measured the gamma ray sensitivity *in vivo* of the cells of marrow which, when injected intravenously into a heavily irradiated mouse, will regenerate its hemopoietic system. They have found, moreover, that these cells *in vivo* are not damaged so much by a given dose of radiation if the dose is broken into two parts separated by a short period of time; this shows that individual cells, given a little time, can recover from certain amounts of radiation damage.

The same technique for studying the regenerative capacity of marrow cells was employed by Professors McCulloch and Bruce in determining whether or not low oxygen tension increases the number of cells in marrow that can regenerate the hemopoietic systems of heavily irradiated animals. Normal animals were exposed to low oxygen tension and their reticulocyte counts and the rate of iron uptake by their marrow and spleen cells both increased rapidly. Marrow cells from these animals were then transfused into heavily irradiated animals and this showed that the number of stem cells that can regenerate marrow was not increased in this active marrow. The evidence, therefore, indicates that the erythropoietic-stimulating factor acts at the level of differentiating cells and not on the stem cells.

Professor Bruce has investigated the radiation sensitivity of cells in hair follicles where mitosis has been synchronized. For this he uses sections of skin of mice cut parallel and deep to the surface. He has found that the sensitivity of these cells is similar to other mammalian cells which have been irradiated outside of the body in tissue culture.

Using an electron-spin resonance spectrometer Professor Hunt has studied the free radicals in irradiated crystals of ribonuclease and good correlations have been obtained between changes in the free radicals and changes in the radiation damage to the enzyme. Biochemical studies indicate that one of the principal points of damage is the rupture of disulphide bridges. The electron-spin resonance spectrometer is also being used to study formation and decay of transient-free radicals produced by the electron beam from the betatron. Interesting temperature-dependent changes have been observed in the free-radical spectrum of frozen cyclohexane.

Professor Helleiner with Mr. M. Gold has measured deoxyribonucleotide polymerase at various stages of the mitotic cycle in synchronized populations of cells grown *in vitro*. The results, which show a drop in the level of this enzyme in the cytoplasm at the times when DNA synthesis is occurring in the nucleus, are best explained by postulating that the enzyme shifts from the cytoplasm to the nucleus in this phase of the cycle. Mr. T. J. Griffith has measured the deoxyribonucleotide kinases in synchronized populations of cells. The enzymes concerned with the synthesis of each deoxyribonucleotide triphosphate change in characteristic fashion with the state of the cells. In collaboration with Professor H. E. Johns, a study of the dimerization of thymine-containing nucleotides induced by ultra-violet (UV) irradiation has been begun. These studies have involved the construction of a very large UV monochromator capable of producing intense UV beams.

### *Studies on Virus and Tumours*

*Polyoma Virus.* Dr. Sheinin has devised methods which allow large amounts of polyoma virus to be obtained in chemically pure form. In addition, she has investigated the effects of fluorodeoxyuridine (FUDR) on the multiplication of polyoma virus, and preliminary results indicate that in the presence of this inhibitor of DNA synthesis, particles are formed that have protein shells. It is not yet certain, however, whether or not these particles contain nucleic acid.

The lack of an accurate and rapid assay method for measuring the carcinogenic potency of preparations of polyoma virus has been an obstacle. Professors McCulloch and Siminovitch have shown that the virus given to newborn rats induces almost no necrotizing lesions in the kidney (which would produce virus) and that the development of tumours in this organ is related quantitatively to the amount of virus given and to the number of days after birth when it is given. A suitable assay method is, therefore, now available.

Dr. Dorfman and Professor Ham studied the development and histopathology of the lesions that develop in the liver of hamsters given polyoma virus. Their study indicates the common lesion is not an hemangioma as was once thought but instead consists of blood-filled cavities that develop as a result of necrosis and which become lined by endothelium which grows into them from veins.

Polyoma virus will induce malignant transformation in hamster embryo cells

being grown in tissue culture. Mr. Stanners and Professor Till have studied lines of malignant cells induced this way in this laboratory and other lines of malignant cells similarly induced in another laboratory. They have shown that these various lines of neoplastic cells differ considerably in their ability to form colonies under different conditions, and the form of the colonies that they form also differs.

*Gross Leukaemia Virus.* Continuing their studies on the mechanism of leukaemia induction by virus, Professor Axelrad and his associates have found that the probability of leukaemia developing in X-irradiated adult mice inoculated with virus is related to the dose of X-ray administered. Different doses of X-ray also caused different degrees of damage to the thymus and this was always followed by thymic regeneration. This finding is consistent with the hypothesis described in last year's report: that susceptibility to virus induction of leukaemia depends on the presence in the thymus of cells whose fate is not completely committed and which are called upon to multiply and differentiate during the normal postnatal growth of the gland or during its regeneration after radiation injury.

They have found also that if healthy bone marrow cells are administered to irradiated animals given virus, the cells do not protect against but, instead, promote, the development of leukaemia.

When heavy doses of X-radiation are administered to the thymus region of normal mice, the lymphocytes of the thymus are destroyed and the epithelial reticular cells are prevented from multiplying, yet regeneration of the thymus still occurs because bone marrow cells in the circulation enter the damaged organ, where they multiply and differentiate. Infection of animals under these conditions with Gross virus leads to leukaemia. Thus, leukaemia induction by virus in mice appears to depend upon infection of a system in which undifferentiated cells multiply and differentiate into cells of the lymphatic series in the presence of thymic reticular epithelium.

The progressive growth of leukaemic cells transplanted into healthy animals was also found to be facilitated by total-body X-irradiation in experiments by Professor Axelrad and Dr. George Tolnai. This suggests that processes are at work in a normal animal that tend to inhibit the growth of leukaemic cells, and that these processes are impaired by X-rays.

*Other Viruses.* With Professors Siminovitch and Fuerst, Mr. Friesen has found that the genome of murine encephalomyocarditis (EMC) virus becomes less and less sensitive to UV light during its development in cells, but that of vaccinia virus does not. With X-rays, vaccinia virus does become less sensitive as it develops; this, however, may be because of secondary changes in the virus-cell complex during virus development and not due to changes in the virus genome.

Mr. Kajioka and Professor Siminovitch have found that some morphological development of vaccinia virus occurs in L cells in the presence of FUDR (a DNA inhibitor), but no mature virus particles are formed. They have also shown that particles inactivated with UV light undergo some morphological development but do not form further mature particles.

Professor Fuerst has found that mutants of EMC virus differ in their resistance to heat, extremes of pH, ability to adsorb to the host cell (Earle's L strain) and in growth properties. When cells are infected with one of the mutants virus development is abortive in a large fraction of the cells but preheating the cells leads to productive virus development; the reasons for this are being investigated.

With Dr. Kaighn, Professor Fuerst is engaged in purifying the virus so that the proteins of the different mutants can be studied. With Dr. Moscarello, he is studying the properties of the ribonucleic acid of the virus.

Mr. L. Prevec, with Professor Whitmore, devised a method for purifying vesicular stomatitis virus; this permitted subsequent chemical studies that showed the nucleic acid of the virus to be RNA.

Professor Johns is investigating the effects of UV light on bacterial and animal viruses. When UV light of a certain wave-length is absorbed in the pyrimidines of a

DNA virus, dimerization occurs between adjacent thymines, preventing replication of the DNA molecule. The repair of these lesions by photoreactivation is being investigated.

*The Architecture of Viruses.* Professor Howatson continued his studies on virus structure and virus-cell interrelationships in collaboration with numerous colleagues. The structure of some twenty different viruses, including several tumour viruses, has been examined in the electron microscope by the method of negative staining. In many instances further information about the structure and the mode of multiplication of the viruses was obtained by thin-sectioning methods. Previously unknown features have been revealed in these studies in the architecture of the following viruses: polyoma, wart, chicken pox, measles, molluscum contagiosum, vesicular stomatitis and rabies. One of the principal aims of these investigations was to determine the morphological characteristics of tumour viruses with a view to examining their relation to viruses in general.

Animal viruses can be classified into four major groups, the classification being based on their structural characteristics, the type of nucleic acid they contain and the site of formation of the virus in infected cells. The four groups have been named clathro R, clathro D, helical R and complex D. Viruses known to have tumour-inducing properties occur in all the groups with the exception of clathro R. The general conclusion from the studies of Professor Howatson and his colleagues is that tumour viruses do not form a separate class of viruses; and indeed, do not differ in the basic characteristics noted above from viruses that are not known to have oncogenic capabilities. Thus, the evidence is mounting to the effect that the ability of viruses to induce neoplasia may be much more general than was previously suspected.

#### *Immunology and Immunochemistry*

Professor Cinader and Dr. Carter have found, by chromatographic and immunochemical methods, that there are six forms of ribonuclease and they have developed a method by which two forms that differ by only one  $\text{NH}_2$  group can be distinguished quantitatively.

Dr. Branster and Professor Cinader found that antibody prepared against ribonuclease inhibits the enzyme non-competitively. Dr. Lafferty has continued the problem with Professor Cinader to find the contribution of aggregation to this inhibition. Univalent antibody which cannot aggregate is prepared by papain digestion. The inhibitory capacity of the antibody can thus be studied without aggregation occurring.

Professor Cinader and Mr. St. Rose are investigating the length of time acquired tolerance, induced in rabbits by one dose of antigen at birth, persists.

Professor Cinader and Dr. Chou have obtained fairly pure preparations of different kinds of leucocytes from normal animals and from animals that were tolerant to a particular antigen. The leucocyte preparations were treated with antigen *in vitro*, washed and injected into newborn animals. With treated preparations of monocytes, lymphocytes or thymocytes, antibody developed within 14 to 20 days. The genetic marking of the gamma globulins of the animals used is being tested to determine whether the antibody is derived from the transferred cells or cells of the host. Dr. Dubiski is participating in the latter investigation. With Dr. Fujio, the radiosensitivity of the cells injected into newborn animals is being determined.

Professor Cinader and Dr. Dubiski are systematically allotyping mice and already have discovered two new allotypes.

Professors Bruce and Cinader have found that non-antigenic substances injected into the peritoneal cavity of animals 1-3 days before an antigen is injected significantly delays the antibody response.

Professors Cinader, McCulloch and Siminovitch, with Dr. Harris, are conducting studies on the synthesis of antibodies in mice with a view to elucidating the genetic basis of antibody formation and the processes of differentiation of antibody-forming cells in the haematopoietic system.

Using the bacteriophage of B megatherium as an antigen, it has been shown that most of the antibody obtained in mice soon after immunization requires complement for its activity, but that following further immunization the proportion of antibody not requiring complement for its activity greatly increases. The kinetics of antibody formation in different strains of mice is being examined. Studies on immune responses of mice following radiation and transplantation into them of cells from marrow, spleen or fetal liver, are also being investigated.

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## MEDICAL JURISPRUDENCE

*Under the direction of Professor K. E. Gray*

In addition to lectures by the two appointed lecturers, addresses were given by two visiting lecturers, the Honourable Mr. Justice Schroeder and the Honourable Mr. Justice Gale of the Supreme Court of Ontario.

In past years the Honourable Mr. Justice Stewart has taken an active part in the course but he was precluded by illness from participating this year.

The lectures dealt with a number of legal topics arising in medical practice. There were discussions of such subjects as the structure of the courts in Ontario, the medical practitioner as an expert witness, the rules of evidence, the law governing consent for operation, sterilization and abortion and malpractice.

## MEDICINE

*Under the direction of Professor K. J. R. Wightman*

A comparison of the Department of Medicine ten years ago and today reveals that the teaching staff has increased from 42 to 107. In this period three new university full-time posts have been created and eighteen full-time posts supported by granting bodies or by arrangement with teaching hospitals. The number of Fellows in the Department has gone from twelve to thirty-six. The departmental budget now contributes approximately one-fifth of the total funds expended by the Department. This tremendous expansion has been occasioned, not so much by the increased teaching load as an increase in the need to study. It is an expansion which could well continue, but the limiting factor is space. In spite of the fact that we have so many new facilities and so much new support, there are still many areas of interest in internal medicine which we are not studying as actively as we should. One could anticipate the need for an even larger staff if an optimal development is to take place and an additional requirement for laboratory space in the various teaching hospitals which would amount to approximately 100,000 square feet.

The present situation at the Toronto General Hospital, with the opening of a new Clinical Investigation Unit and the laboratories associated with it, is much better than it was. However, we have already made representations to the Board of Trustees of the hospital as to future needs which are being considered by a special Planning Committee. The improved facilities at the Medical Outpatients Clinic are also much appreciated and have made the teaching programme there more satisfactory. Changes at the Toronto Western Hospital have improved the teaching wards as far as accommodation goes, although there is still a need for increased numbers of teaching beds in Medicine at that hospital. The laboratory space which, it is anticipated, will be released for investigative work at the Toronto Western Hospital will

prove extremely valuable. The new auditorium and other teaching facilities at that hospital have already had an effect on its function.

The pressure for an immediate increase in research laboratory space became so great that the Dean made representations to the University, which resulted in a house at 86 Queen's Park being made available for this purpose on a temporary basis. It is contemplated that it will become a centre for a co-ordinated assault on the problems of atherosclerosis, blood coagulation, anticoagulant therapy, and a range of related haematologic and chemical studies. A Psychiatric Unit at the Toronto General Hospital seems imminent, after long discussion. The development of psychiatric units in general hospitals is a matter which seems to find universal support in theory, but presents certain difficulties in practice in a local setting. It is still the feeling of the members of the Department of Medicine that a close liaison between the psychiatrists and the internists in the hospital is a matter of great importance.

Future plans appear to involve an expansion of facilities at the Wellesley Hospital, with generous provision for research work. Among other things, it is planned that the group working in arthritis and rheumatism will make their headquarters there. Enlargement of the facilities at St. Michael's Hospital is also expected in the near future. In the meantime a committee has been set up to study the provision of additional clinical laboratory space on university premises. All these developments are most encouraging. It is a little disturbing to note how much of the support of our department comes from voluntary agencies. It is greatly appreciated, but it should be more nearly balanced by funds that have greater promise of continuity.

There have been a few changes in the teaching arrangements. The various hospitals and units have been placed more on their own with respect to making dispositions for their classes, and the rather clear-cut distinction between second-, third- and fourth-year teachers has been broken down by rotating the assignments from term to term. The separate theatre clinics for the final-year students at each of the teaching hospitals seemed to have worked out well and provided a source of stimulus for both staff and students. A conference of the whole department was held immediately after the examinations to discuss a variety of problems with regard to teaching and many helpful suggestions were received. The problem of communication in a department of this size is formidable, but the opportunities for flexible adaptation are very great. For the first time this year, an executive assistant was appointed, in the person of Dr. Duncan Gordon. He has performed a most useful service and has established the value of this post to the department. However, he has chosen to undertake a more scientific line of endeavour and is leaving us to study rheumatic diseases in Rochester. Dr. C. R. Burton has agreed to undertake this work for a year at least.

It was a source of regret that Dr. Hurst Brown came to his retirement this year after many years of service with the Department. He is being replaced by Professor Irwin Hilliard who was formerly a member of the staff of the Western Hospital and at present is Professor of Medicine at the University of Saskatchewan. Dr. Norman Wrong, Head of Dermatology, has elected to retire this year, but has agreed to continue as a graduate lecturer and has been appointed a consultant to the Toronto General Hospital. Dr. E. J. Trow is to take up the responsibility for the service. The department has been strengthened by changes in the Princess Margaret Hospital. Dr. D. M. Whitelaw has succeeded Dr. Warwick as Physician-in-Chief and is building up a staff in medicine which will undoubtedly increase the potential for undergraduate teaching and postgraduate training, as well as having its impact on research. Dr. Robert Pos has been appointed to the Psychiatric Service at the Toronto General Hospital, while Dr. Rowsell has resigned his post in this field at the Toronto Western Hospital.

In January, during the meeting of the Royal Colleges, a testimonial dinner was tendered to Professor Duncan Graham on the occasion of his 80th birthday. Former students of his from all across the country attended this dinner and a presentation was made by the late Dr. John Oille, whose subsequent death brought sorrow to all who had known him.

The department has entertained a large number of visitors, much to its profit and enjoyment. They are listed as follows: Sir George Pickering, Oxford, England; Professor Alan Kekwick, London, England; Dr. Paul Wood, London, England; Professor F. C. Courtice, Canberra, Australia; Dr. Malcolm Whyte, Sydney, Australia; Dr. Ralph Reader, Medical Director, National Heart Foundation of Australia; Dr. Ilsley Ingram, St. Thomas' Hospital, London, England; Professor J. Hamburger, Hôpital Necker, Paris, France; Dr. A. J. Barnett, Baker Institute, Melbourne, Australia.

At the time of the International Tuberculosis Meeting the department was visited by Professor George Brouet, Dr. A. Meyer and Dr. E. Bernard from Paris. A group of physicians from India and Pakistan spent a week in the city. They included Dr. B. J. Sikand, Dr. M. K. Vaidya, Dr. H. E. Patel and Dr. Hafiz Ulla.

Members of the staff delivered the following lectures: Dr. H. J. M. Barnett, a series of lectures at the International Medical Assembly of South-West Texas; Dr. J. H. Crookston, at the University of Washington, Seattle; Dr. C. Ezrin, an address to the Harvey Cushing Society in Chicago; Dr. Dorothy Ley took part in a symposium at the European Congress of Haematology in Vienna, and Dr. Fraser Mustard in the International Symposium on Myocardial Infarction at the Henry Ford Hospital, Detroit, and the International Symposium on Atherosclerosis in Bombay, and at a meeting of the National Science Council, National Academy of Science in Washington. He was also invited to give an address at the University of Georgia. Dr. J. C. Richardson addressed the Congress of Neurological Surgeons in New York. Professor K. J. R. Wightman gave addresses at a Postgraduate Course in Vancouver, the Montreal Medico-Chirurgical Society, the Hamilton Health Association, Lambton County Medical Association, the Interservices Military Hospital, Kingston, and the Laennec Society, Toronto. Dr. E. R. Yendt was invited to speak at the Lambton County Medical Association.

The degree of co-operation and support offered by the staff continues at a remarkably high level, and is much appreciated by the head of the Department.

## RESEARCH

### *Allergy*

A study of the immunology of insect anaphylaxis is being carried out by Dr. J. Fitzgerald, with Dr. R. Bladek and Dr. A. Sepp, and with the collaboration of the Department of Apiculture at the Ontario Agricultural College. Dr. Fitzgerald and Dr. Alice Briggs are also studying the effect of repository antigen therapy in seasonal pollenosis.

### *Cardiovascular*

At St. Michael's Hospital, Dr. J. K. Wilson and Dr. P. Forbath have reviewed a large series of postoperative patients with mitral stenosis. There have also been four patients with tricuspid stenosis who were operated upon. Drs. Wilson and Forbath are studying the use of Spironolactone and have tested certain new compounds in angina pectoris. A study of Marfan's syndrome is being continued. Dr. Harold Fields has made a detailed study of 271 patients with cardiac infarction with a view to identifying factors in the pathogenesis, the earliest symptoms, and the natural history of this disease.

At the Toronto General Hospital, Dr. Ramsay Gunton has studied the application of angiotensin as a pressor agent, the value of Triamterene as a diuretic, and is working with the technique of coronary cine-angiography. With Dr. J. Evans, he is working on the application of radioisotope scanning techniques to the heart, using labelled fat. Drs. R. L. MacMillan and K. W. G. Brown have reported a detailed study of the value of anticoagulant therapy after coronary thrombosis, and have established an Acute Coronary Thrombosis Unit to which new patients are admitted under circumstances which it is hoped will permit a greater salvage (since 25 per cent of such patients die within the first 48 hours), and at the same time, allow study

of important features of the disease. Dr. E. D. Wigle is using catheter techniques to investigate patients with pulmonary hypertension and to compare the ventilation and perfusion relationships in their lungs. A series of patients with hypertrophic muscular stenosis of the aortic outflow tract have been operated upon, and are being studied. Left heart catheterization is being performed frequently with a new technique. Dr. Wigle has studied certain patients who have dyspnea, in which the defect seems to be a low avidity of skeletal muscle for oxygen from the circulating blood. Dr. C. R. Burton, with Dr. Luis de Carvalho, is evaluating the vector-electrocardiogram and the use of orthogonal leads in special types of heart disease. Dr. John Evans is continuing the work instituted in Boston, which involves perfusion of the isolated rat heart in a way which allows measurement of the uptake of fatty acids and other substances in the metabolism of heart muscle. He is also involved in a collaborative study with Dr. H. G. Downie, Dr. H. C. Rowsell (Ontario Veterinary College) and Professor J. D. Hatcher (Queen's University) to investigate the factors involved in closure of the ductus arteriosus in swine. He is also continuing the follow-up observations of patients previously studied at the Hospital for Sick Children who have had acute rheumatic fever, ventricular septal defect, aortic valve stenosis, etc. Dr. John Morrow is studying antihypertensive drugs. Dr. E. R. Yendt and Dr. Douglas Wilson have investigated 65 patients whose clinical history suggests that their hypertension might be due to renal vascular disease, and therefore susceptible to cure by nephrectomy. This has involved study of the ability of each kidney to secrete water and sodium separately, using two different methods. Angiograms and radioactive scanning techniques using isotopic mercury have also been employed. In this group of patients, eighteen appeared to have renal-vascular disease. Eleven of these have been operated upon to date. Dr. Wilson is also studying the effect of chlorothiazide diuretics on calcium and magnesium output in the urine. Dr. Fraser Mustard is conducting a series of researches on the relationship of platelets, blood coagulation and vascular disease. These involve studies in Guelph at the Ontario Veterinary College, work at Sunnybrook Hospital in collaboration with Dr. Hugh Smythe, Dr. Alick Little, and others, and projects at the Toronto General Hospital, with Dr. J. H. Crookston, Dr. Smythe, and others.

At the Toronto Western Hospital, Dr. Susan Lenkei is also working on the technique of cine-angiocardiology, is measuring blood volume changes in patients having heart operations, and employing the technique of intra-cardiac phonocardiography in the study of valvular lesions. Dr. A. J. Kerwin is continuing a long-term project on vector-electrocardiography and an evaluation of two types of exercise tolerance tests. Dr. A. Rapoport, in conjunction with Dr. D. R. Wilson of the Department of Surgery, is studying experimental renal hypertension.

In the cardio-respiratory field, Dr. C. Woolf, working at Sunnybrook Hospital and at the Toronto General Hospital, has been studying the mechanisms of dyspnea in patients with various types of heart disease. In general, it appears that increased pressure in the pulmonary artery or in the left auricle may damage the lung and necessitate a higher degree of ventilation of the lung to produce adequate oxygenation of the blood. A new test has been devised in which the work needed to allow the uptake of one unit of carbon monoxide is calculated on a standard basis, to allow comparison of patients with various disorders. Detailed study of cardiac patients who are booked for operation from a respiratory point of view has enabled the patients who require special postoperative care to be identified in advance, so that the proper precautions can be taken. An ingenious method for testing cough suppressant medications was worked out and used in patients with chronic bronchitis at Sunnybrook Hospital. This involved the use of a self-activating tape recorder which allows one to count the number of times a patient coughs during the night, for example.

### *Clinical Chemistry*

Dr. W. R. Campbell has devised methods for the simultaneous measurement of calcium and magnesium in the same specimen of serum, and is also working on a technique for the measurement of these substances in feces and food.

*Dermatology*

Dr. M. G. Williams, who works in collaboration with the Department of Medical Biophysics, is studying the common wart, having studied the causative agent in some detail. He is now turning his attention to the problem of resistance mechanisms, and the possibility of therapeutic methods. He is using fluorescent antibodies to study the polyoma virus, and the electron microscope to investigate the lesions of herpes, varicella, and molluscum contagiosum. At St. Michael's Hospital, Dr. A. L. Hudson and collaborators are studying new antipruritic agents, and the response of psoriasis to anticholinergic drugs.

*Endocrinology*

*Adrenal.* Dr. R. Laidlaw and Dr. C. Bird are studying the effect of progesterone as an antagonist of aldosterone. They have found that the response to progesterone administration in a patient who has an aldosterone-secreting tumour differs from that of a patient who has hypertension due to renal artery occlusion, although both patients may have elevated secretion rates of aldosterone.

*Diabetes.* Between 150 and 180 new patients are seen at the Diabetic Clinic annually at the Toronto General Hospital. They are of many nationalities and are referred by many different agencies. In the Medical Outpatients Clinic, Dr. W. B. Spaulding, with the collaboration of one or two medical students who have worked in the clinic, has drawn attention to the fact that many patients who are shown to be diabetic by blood sugar estimation do not have sugar in their urine. In a series of 2,000 patients studied at the clinic, 15 fell into this category. Dr. C. Ezrin, with the collaboration of Dr. Lois Stockleback, is working on the insulin-binding capacity of serum in various types of patients. At St. Michael's Hospital, Dr. Alick Little has studied the application of sulphonated insulin to patients who have brittle diabetes, and also the evaluation of a new oral anti-diabetic agent.

*Gonads.* Dr. Laidlaw and Dr. Bird, inquiring into the reason for the difference in metabolism of uric acid in pre-menopausal women, have discovered that 17-hydroxiprogesterone exerts a marked uricosuric effect. Dr. D. W. Killinger, with Miss M. Stiefel, has worked out a technique of measuring progesterone secretion rate.

*Pancreas.* Dr. C. Ezrin, working with members of the Department of Surgery, has made an extract of a pancreatic tumour which was producing a potassium-losing diarrhea in a patient. This extract was found to contain a substance which stimulated gastric secretion in dogs. A series of extracts of normal pancreatic tissue are now being made to study the possibility that this is one of the functions of the pancreas.

*Parathyroids, Calcium, and Magnesium.* Dr. Yendt, Dr. Barbara Hunt, Dr. D. R. Wilson, and Dr. R. W. Kimber have studied a large number of patients with hyperparathyroidism. In nearly all instances, accurate measurement of the serum calcium indicates an abnormality, but in one patient the serum calcium was usually normal, and only the response to intravenous calcium infusion was abnormal. Studies of ultra-filterable calcium and magnesium in the blood have been carried out. The level of calcium in the spinal fluid corresponds to the ultra-filterable level under normal circumstances, but does not rise as rapidly in circumstances which produce hypercalcaemia. On the other hand, the magnesium in the spinal fluid is higher than that in serum. An infusion of calcium produces a marked fall in the ultra-filterable serum magnesium level, although only a small change in the total magnesium. Magnesium deficiency in hypo-parathyroidism interferes with the patient's response to Vitamin D. When magnesium is given, the serum calcium rises, although net absorption from the gut is diminished and the losses in the urine are increased. This is taken to indicate that the bones are the main site of action of Vitamin D under these circumstances, and that magnesium is necessary to facilitate this effect. Magnesium has no effect on the disease, apart from this. The treatment of hypercalcaemia due to sarcoidosis with chloroquin has been found to be satisfactory. This is an original observation, and is being followed up. Patients with osteomalacia due to the

Fanconi syndrome or with reduced phosphate in the blood have been satisfactorily treated with phosphate solutions. These patients do not respond to Vitamin D administration. Dr. Joan Harrison is studying the metabolism of calcium and strontium, using radioactive isotopes and a whole-body counting technique, in collaboration with Dr. Finlay and with Professor McNeill of the Department of Physics.

*Pituitary.* Dr. C. Ezrin is continuing his study of the cytology of the pituitary in health and disease, and is assisting in the preparation of an Atlas. He is studying the effect of oxytocin on renal function in patients who have disturbances of water and salt balance.

*Thyroid.* At St. Michael's Hospital, Dr. H. P. Higgins, with Dr. Andrew Diosy, has been studying sub-acute thyroiditis. They feel that thyroid-stimulating hormone may have something to do with the production of this syndrome, and are using triiodothyronine to suppress the formation of this hormone. A biochemical investigation of the occurrence of abnormally iodinated tyrosine derivatives is under way, using radiochromatographic methods. At the Toronto Western Hospital, Dr. Robert Sheppard is studying thyroid-stimulating hormones. At the Toronto General Hospital, Drs. M. W. Johnston, C. Ezrin, R. Volpé, and L. Loach, and Miss Amy Britton, have been investigating thyroxine-binding proteins in serum, and comparing the avidity of various binding sites for different compounds. (Chromatographic methods are being used to study serum and tissue fractions.) The non-specificity of circulating antibodies to thyroid seems to have been established. The study of iodine-induced myxoedema continues. A collaborative project with Dr. Sellers and Dr. and Mrs. Schönbaum of the Department of Pharmacology is under way to elucidate the relationship between thyroid-stimulating hormone and abnormal thyroid activators which may be encountered in disease.

### *Gastroenterology*

At the Women's College Hospital, Dr. C. Hetenyi is continuing studies of the malabsorption syndrome. Dr. J. Finlay and Dr. D. C. Mortimer are also working in this field, with particular interest in bacterial changes in the upper small bowel which may be encountered in diabetic patients, patients from post-gastrectomy, and in those with secondary steatorrhea. They are also studying other post-gastrectomy states, and investigating the use of the fiberscope and the Menghini needle. Dr. J. C. Sinclair is continuing his studies of acute hepatitis, using tissue culture techniques.

### *Haematology and Neoplastic Disease*

At the Princess Margaret Hospital, Dr. D. M. Whitelaw, Dr. J. W. Meakin and their associates are engaged in numerous projects, which include investigation of adrenal function in patients with bronchogenic carcinoma, a study of the serum magnesium in patients whose serum calcium is elevated, investigation of the effect of cortisone on neoplastic cells, elucidation of the function and fate of lymphocytes, evaluation of local irradiation treatment in Hodgkin's disease, in comparison with more widespread treatment, and a study of new chemotherapeutic agents. Dr. Alan Bruce-Robertson is measuring serum protein changes in malignant disease and in the acute radiation syndrome. Electrocardiographic changes in hypercalcaemia are being studied in collaboration with Dr. D. P. Murnaghan and others. The work of Dr. E. A. McCulloch is reported by the Department of Biophysics. Dr. Jules Harris, who is a candidate for the degree of Doctor of Clinical Science, is studying antibody formation, using a bacteriophage as an antigen. At St. Michael's Hospital, Dr. K. R. Butler has been treating patients who have Hodgkin's disease with vincablastine. Dr. C. J. Bardawill has continued with his investigation of various enzymes in the serum and leukocytes of patients who have neoplastic and haematologic disorders. At the Toronto Western Hospital, Dr. Dorothy Ley is studying the chemotherapy of malignant disease and the pathogenesis of anemia in patients with cancer. At the Toronto General Hospital, Dr. Crookston and his associates are involved in coagula-

tion studies, investigation of platelet turnover in thrombocytosis and thrombocytopenia, and the investigation of patients with rare blood groups. A study on haemolysis, particularly in relation to haptoglobins and gluco-6 phosphate dehydrogenase activity is under way. The value of 6-mercaptopurine in the treatment of acquired haemolytic anemia is being tested. The platelet work is being carried out in collaboration with Dr. J. F. Mustard. A co-operative venture in the testing of concentrates of haemophilic globulin and the Christmas factor is being prosecuted in collaboration with Dr. MacMillan, Dr. Brown, and Dr. Mustard.

### *Neurology*

At the Toronto Western Hospital, Dr. J. L. Silversides is continuing a study of multiple sclerosis. Dr. A. M. Park and Dr. J. Crawford are continuing their work on nerve and muscle disorders and injuries and the study of aphasic patients is being continued by Miss McGeachy. At the Toronto General Hospital, Dr. J. Humphrey has undertaken an intensive study of electromyography, muscle biopsy, and nerve conduction studies in a variety of conditions. Some enzymatic abnormalities of muscle are being investigated and the technique of electron microscopy applied to neuromuscular disorders. Metabolic and electrolyte studies in myxoedema and periodic paralysis are also being carried out. Dr. H. J. M. Barnett has maintained his interest in carotid artery lesions, and has instituted a study of certain phosphorylated organic compounds, in collaboration with Dr. Kalow of the Department of Pharmacology. Dr. J. C. Richardson, with Dr. R. Einhorn, has carried out a survey of the incidence and nature of cerebral hemorrhage occurring in hypertensive patients. Dr. Richardson has also continued his investigation of Wilson's disease, in collaboration with Dr. Dauphinee of the Department of Pathological Chemistry. Two additional patients have been treated with penicillamine. The work of Dr. J. Scott is largely reported in the Department of Physiology. Dr. Scott is playing an active part in the work of the Defence Research Board in a number of fields.

### *Psychiatry*

The members of the Department who work mainly in the general hospitals have carried out research activities which are reported by the Department of Psychiatry.

### *Renal Disease*

At the Toronto Western Hospital, Dr. A. Rapoport is studying renal hypertension and various problems in electrolyte metabolism. He is also a member of the team which operated the artificial kidney there. At the Women's College Hospital, Dr. F. M. Hill is making a survey of the occurrence of bacteria in the urine of pregnant women, with a view to determining the incidence of pyelonephritis, and the effect this has on such things as premature delivery, etc. To date, they have examined 800 patients. At the Toronto General Hospital, Dr. E. R. Yendt and his associates have been interested in renal tubular defects of various types, and the pathogenesis of renal calculi, in addition to the work on renal hypertension noted above. The artificial kidney is the responsibility of Dr. W. T. W. Clarke, with the assistance of Dr. George Smith from the Wellesley Hospital.

### *Rheumatology*

Dr. Wallace Graham is conducting clinical trials of anti-inflammatory agents. His main occupation is the special unit at the Queen Elizabeth Hospital, which was established for the long-term active treatment of patients with rheumatoid disease and the study of certain factors important in their treatment. A follow-up clinic is in progress to determine how well the improvement most patients achieve while in the unit is maintained when they leave. Dr. Graham has been assisted in this work by Dr. P. MacGregor. Dr. M. A. Ogryzlo has carried out a long-term evaluation of sulfinpyrazone in gout. Over long periods of time, it appears to continue to exert a good effect on the serum uric acid, the joint lesions and the tophaceous deposits in this disease. The influence of several other diuretics on uric acid metabolism has been studied. Previous work on plasma protein disturbances in a variety of diseases

has been continued. With the collaboration of Dr. V. Halmos, a project to determine the possible relationship of tryptophane to some of the manifestations of rheumatism has been initiated. A group of patients suffering from Wegener's granuloma has been collected, and a detailed review of this subject is in progress. Dr. H. Smythe is working with radioactive uric acid to determine the uric acid pool, turnover, and excretion patterns in various types of gout and in some patients with platelet disturbances. In collaboration with Dr. Mustard and Dr. Ogryzlo, he has been studying the platelet turnover in gout and the effect upon this of sulfinpyrazone. There seems to be a relationship between gout and premature atherosclerosis. Sulfinpyrazone appears to reduce the rate at which platelets are used up, and might conceivably act to delay the incidence of vascular disease. Dr. McNeely is assisting him in this work.

### Miscellaneous

The establishment of a new geriatric acute disease unit at the Toronto Western Hospital has provided an opportunity to gauge the response of old people to acute injury and illness. This is a project which has been carried out by Dr. J. Crawford, Dr. Earle E. Brown, Dr. Lotto and Dr. Rapoport.

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## OBSTETRICS AND GYNAECOLOGY

*Under the direction of Professor D. E. Cannell*

In the course of the past year, the changes recommended by a committee under the chairmanship of Drs. Shier and Allemang have been implemented. The present fourth year is the last in which didactic lectures will be given in the final year. The lecture course in Obstetrics and Gynaecology will be completed in the second and third years. In the time thus made available in the fourth year, practical problems in the practice of Obstetrics and Gynaecology will be presented to the group in the form of clinical conferences. There have been no changes in postgraduate teaching. There has been some alteration in the practical experience available to the postgraduate

students at the Toronto General Hospital. It is hoped that this will be beneficial in providing earlier and greater training in clinical Obstetrics and Gynaecology.

The Department is pleased to report the success of Drs. L. A. Belch, A. B. Giffen, T. M. O'Heany, M. M. Spivak and I. G. Van Praagh in obtaining their Fellowship in the Royal College of Physicians and Surgeons of Canada.

The Department was honoured by visits from Drs. Nicholas Eastman, Baltimore, Maryland; W. Hawkesworth, Oxford, England; Richard R. Trussell, Makerere College, Uganda; Rees Lloyd-Jones, Middlesex Hospital, London, England; A. St. George Huggett, St. Mary's Hospital, London, England; and G. W. Theobald, Eastbourne, England.

A short refresher course for general practitioners was held in the fall of 1961. The popularity and demand for this has led to the development of a similar programme for the fall of 1962.

The staff has continued to participate in scientific meetings throughout this country and abroad.

New facilities for the Department have reached the planning stage at St. Michael's and Wellesley Hospitals. The improved situations which will result in both institutions should enhance both teaching and investigation in these important units of the Department.

Drs. Donald Moore and I. G. Van Praagh have spent the past year in Great Britain in further postgraduate training.

Dr. Richard Wilson spent the last eighteen months in basic studies in Biochemistry and Steroid Chemistry in Toronto and at the Worcester Foundation for Experimental Biology in Shrewsbury, Massachusetts. He was awarded a Markle Foundation Fellowship and will spend the next year continuing his studies in Sweden. Upon his return, he will set up a Division of Steroid Chemistry within the Department. Funds for the provision of a laboratory and support of personnel have been provided through the generosity of the Johnson Wax Company. It is anticipated that this new Division will complement the clinical investigations of endocrine function which are being conducted in the Department. Dr. Wilson will become a member of the staff with the rank of Associate.

The Department records with great regret the retirement of Drs. H. W. Johnston and A. D. T. Purdy. Dr. Johnston has served the Toronto General Hospital and Department since 1927. He was one of the pioneers of radical surgery for carcinoma of the cervix in Canada. His contribution to both undergraduate and postgraduate teaching has been of great significance.

Dr. Purdy has served the Toronto Western Hospital and Department since 1937, with zeal and loyalty. His practical knowledge of Obstetrics and Gynaecology and his ready wit have endeared him to both his colleagues and students.

To both these men we owe a considerable debt of gratitude. We wish them well as they devote themselves to private practice.

It is with a mixture of pride and regret that we record the resignation of Dr. William Paul from the Department. He goes to undertake his new post as Professor and Head of the Department of Obstetrics and Gynaecology at the University of Alberta in Edmonton. In the course of his association with the Department since 1955 as Dominion Stores Fellow, Dr. Paul has been a stimulating teacher, organizer and research worker. The recognition of these gifts led to his present appointment.

The Head of the Department wishes to thank all his colleagues in the Department, Faculty and University for their generous co-operation and assistance during the past year.

## RESEARCH

Members of the staff have undertaken the following research work. Dr. T. A. DORAN has conducted a study of the incidence of tumour cells in the blood stream during all phases of treatment of endometrial cancer. A parallel study is also being

carried out with other gynaecological malignancies. The long-term follow-up of this group of patients may give some clue to the variability of survival which occurs without apparent reason.

Dr. J. L. HARKINS has carried out an investigation of a new progestational agent, 1298, in conjunction with Drs. ALLEMANG and DORAN. The Department of Pathological Chemistry has been responsible for the steroid estimations which have been an important aspect of the investigation. The effectiveness of this drug as a progestational agent is being determined by histological studies of the endometrium. Cytological and selected biochemical assays are being carried out. The effectiveness of the drug in control of ovulation with maintenance of acceptable menstrual function is being studied. Its long-term effectiveness and possible toxicity is being observed in cases of endometriosis.

Dr. W. J. HANNAH is conducting a study of the relationship of asymptomatic bacteriuria in pregnancy to toxemia, prematurity and acute pyelonephritis.

Dr. J. A. LOW has continued his investigations of foetal oxygenation, disturbances of acid-base balance and carbohydrate metabolism in the newborn at delivery in normal and abnormal obstetric situations. Further studies of the adjustments of intravascular volume in obstetric patients in late gestation and in the newborn immediately following delivery are being carried out in suitable situations. He is also investigating mechanisms relevant to bladder function with particular reference to the problems of urinary incontinence.

Dr. WILLIAM PAUL has determined in animals the predictable changes in the chemistry of amniotic fluid secondary to uterine ischemia. Similar observations in human amniotic fluids have not as yet shown a consistent clinical application. Studies in the mechanism of foetal heart slowing with cord manipulation in sheep have been carried out.

Dr. T. G. RYLEY has been studying leukocytes in tissue culture and making preparations of the dividing cells to study the chromosomal constitution of an individual. Patients with amenorrhea, intersexuality and other congenital abnormalities are being studied. Some success has been achieved with the culture of leukocytes from the placentae of newborns as a method of studying congenital anomalies noted at the time of birth.

Dr. C. P. VERNON has investigated the effect of massive doses of progestational steroids on endometrial carcinoma and the resultant endocrine effect. He is also conducting an assessment of the various chemotherapeutic agents in general gynaecological malignancy, with emphasis on carcinoma of the ovary. An attempt is being made to assess the effect of combined radiotherapy and chemotherapy in these malignancies.

## OBSTETRICS AND GYNAECOLOGY

ALLEMANG, W. H. "Pregnancy in the Absence of Adrenal Cortical Function" (*Canadian Medical Association Journal*, vol. 85, July 15, 1961, pp. 118-22).

HARPER, J. A. "Hematocolpos with Imperforate Hymen" (*American Journal of Obstetrics and Gynecology*, vol. 82, no. 2, Aug., 1961, pp. 268-70).

LOW, J. A. "Role of the Normal Female Urethra in the Sphincter Mechanism of the Bladder" (*American Journal of Obstetrics and Gynecology*, vol. 82, no. 1, July, 1961, pp. 1-9).

SHIER, C. B. "Prognosis in Carcinoma of the Cervix as Determined by Vaginal Smear" (*American Journal of Obstetrics and Gynecology*, vol. 82, no. 1, July, 1961, pp. 37-41).

## OPHTHALMOLOGY

*Under the direction of Professor Clement McCulloch*

During 1961-2 there were 15 students registered in the formal, three-year, graduate training programme in Ophthalmology. The Canadian National Institute for the Blind Fellows for the year were Dr. G. M. Cobb of St. John's, Newfoundland and

Dr. J. D. Morin of Vancouver, British Columbia. Dr. L. D. J. Chisholm of Vancouver was appointed a Fellow under a Defence Research Board of Canada grant and Dr. D. M. Dorsey of Kingston, Ontario, was a Fellow under a Dominion-Provincial Public Health Grant. Dr. H. P. Brent, Toronto, Dr. W. S. Hunter, Toronto, Dr. D. L. Anderson, Saskatoon and Dr. R. R. Toews, Niagara Falls completed the graduate programme. Dr. R. E. Groshaw of Palmerston, Ontario, who has been in training at Sunnybrook Hospital, also completed the formal programme in the University. An R. Samuel McLaughlin Travelling Fellowship was awarded to Dr. W. S. Hunter who proposes to study eye pathology at centres in the United States.

Occasional students in Ophthalmology registered during the year with the Postgraduate Division of the Faculty were Dr. Policarpo de Jesus from the Philippines, Dr. Sujone Judobidroto from Indonesia, both under the Colombo Plan, Dr. J. A. Liverpool from the West Indies, Dr. J. A. Killoh of Regina and Dr. M. Kovac, who is a graduate from Zagreb, Yugoslavia and now of Toronto.

In the undergraduate training programme for the third Medical year the emphasis has been placed on ophthalmoscopy, diseases of the inner eye and the value of the ophthalmoscope in general medical practice. In the fourth Medical year attention has been concentrated on all other ocular disease and disease of the ocular adnexa. For the first time the Kagan Prize for the best fourth-year marks in ophthalmology has been offered. The Department is grateful to Mrs. Sidney Muskin for making this prize available.

The Second Clinical Convention of the University of Toronto Eye Alumni was held in November and was well attended. The Alumni presented a number of papers and the five senior residents gave papers competing for the Alumni Prize. This was won by Dr. R. E. Groshaw, who discussed "The Ophthalmic Manifestations of Reiter's Syndrome." The Walter W. Wright Lecture was given on the same day by Professor Michael J. Hogan of the University of California Medical School and the Francis E. Proctor Laboratory. He spoke on "The Etiology of Uveitis." The Alumni have been active, holding a major meeting in June at the time of the Canadian Ophthalmological Society meeting. They have also circulated several issues of the newsletter and have continued to support the "Professor A. J. Elliot Residents' Travelling Fund." The Department is fortunate to have such a loyal group of graduates.

During April the Department sponsored an Eye Surgery Clinical Meeting which was attended by 44 ophthalmologists, coming from across Canada and from the neighbouring United States. The guest surgeons were Mr. Patrick Trevor-Roper from Westminster Hospital and the Institute of Ophthalmology, London, England and Dr. Arthur Gerard DeVoe, Chief at the Presbyterian Hospital Institute of Ophthalmology in New York City. Besides the papers by the guest surgeons the programme included symposia on ocular trauma, vertical ocular motor anomalies and glaucoma. During the meeting Col. E. A. Baker, Managing Director of the Canadian National Institute for the Blind, presented to the Department a group of microscopes for the residents' pathology study room. The Departmental Research Meeting, under the direction of Professor P. K. Basu, was held just prior to the Eye Surgery Meeting. The guest of honour was Dr. Endre A. Balazs, Director of The Retinal Foundation, Boston, who spoke on the fine structure of the vitreous. In all nineteen papers were given at this meeting. The first John Gaby Prize for the best paper from a Fellow was given to Dr. G. M. Cobb for his work on the control of immunologic reaction in corneal grafts. The breadth and depth of the work represented in these papers is a tribute to the research staff under the direction of Dr. Basu. The Department is grateful to Mr. H. G. Stapells, Q.C., who continues to make this programme possible.

The participation in outside conferences and the scholarly visits undertaken by the staff during the year have been extensive. Cambridge University has accepted Dr. Clive B. Mortimer's thesis on congenital cataracts and has awarded him an M.D. degree. He returned to the Department after a year's travel in Europe on a McLaughlin Fellowship, studying the latest treatment for retinal detachment. Dr. Mortimer, Dr. H. M. Macrae and Dr. M. Shea attended the Fourth Conference of the Retinal Foundation at Castle Hill, Massachusetts, where Dr. Shea gave a paper

on complications common to all types of surgery for retinal detachment. Dr. Macrae and Dr. Mortimer attended the Gonin Club Conference on retinal detachments in Lausanne. Dr. C. McCulloch attended the U.S. Armed Forces-N.R.C. Vision Committee meeting and the Optical Society of America meeting in Washington. Dr. H. R. Hausler attended a round-table conference on Diabetes at Chicago; he also addressed the Buffalo Eye Club on the subject of diabetic retinopathy. Dr. J. C. Hill has taken part in the advanced course in ophthalmic plastic surgery at the American Academy of Ophthalmology and Otolaryngology and has written a chapter in the manual on plastic surgery put out by the Academy. Dr. G. A. Thompson is Medical Director of the Eye Bank of Canada, Ontario Division. In this capacity he has spoken to many lay organizations on the subject of corneal transplantation. As Chairman of the Section of Ophthalmology of the Ontario Medical Association he has continued active interest in the problems of ophthalmic practice. Dr. D'Arcy Macdonald has visited the Fritz Jardon Laboratories in Detroit to study the latest forms and uses of contact lenses. Dr. A. L. Morgan and Dr. J. S. Crawford have written the chapter on "Pediatric Eye Diseases and Surgery" in the book *Pediatric Surgery* edited by C. D. Benson. Dr. Crawford is chairman of the Panel on Visual Problems of the Defence Research Board. He also is adviser to the Department of Transport on eye standards in aviation and has spoken before members of courses put on by that department. He participated in the "Symposium on Ptosis" put on by the American Academy of Ophthalmology and Otolaryngology. Dr. R. G. C. Kelly attended the meeting of the Pan-American Association of Ophthalmology in Lima, Peru, and will be President of the Seventh Pan-American Congress, in Montreal. He has lectured on traumatic ophthalmology to the Civil Defence College at Arnprior. Dr. W. R. F. Luke spoke on tonography before the Section of Ophthalmology of the Ottawa Academy of Medicine. Dr. Luke, Dr. C. McCulloch and Dr. P. K. Basu attended the First National Conference on Glaucoma, held at Ottawa. Dr. Luke and Dr. McCulloch attended meetings of the Tonometer Testing Committee of the American Academy of Ophthalmology and Otolaryngology. Dr. J. S. Speakman was chairman of the Section of Ophthalmology of the Toronto Academy of Medicine. Dr. Speakman gave an exhibit on the aetiology of chronic simple glaucoma at the American Medical Association meeting. Dr. R. C. French visited the Biochemical Section of Wills Eye Hospital in Philadelphia. Dr. P. K. Basu contributed to a seminar on the fate of corneal grafts at Columbia University and attended the Annual Meeting of the Association for Research in Ophthalmology. Under the guidance of Dr. Basu the Department has strongly supported the meeting of the East Central Section of the Association for Research in Ophthalmology, where five papers were given. It has, similarly, strongly supported the annual meeting of the Canadian Ophthalmological Society. Dr. C. McCulloch has been President of the Eye Alumni of the Presbyterian Hospital in the City of New York. It is of interest that Dr. A. E. MacDonald, of our emeritus staff, is on the International Council of Ophthalmology. The Department was visited by Professor K. Hruby of Graz, Austria and Professor Edwin Dunphy of Harvard University. The Department has continued to aid in the functioning of the Ontario Division of the Eye Bank of Canada. This has become the largest single source of eyes in Canada.

The Department has received an anonymous gift for a fundus camera at the Toronto General Hospital. It is grateful for a grant from the J. P. Bickell Foundation to purchase special tonography equipment. It also appreciates a grant from the Banting Foundation for the purchase of radio-isotope recording equipment. The Selkirk Eye Research Fund and the Eye Alumni Fund have made possible research in the prevention and treatment of ocular disease and travel of those engaged in the work. The A. E. MacDonald Foundation has aided the Department in the purchase of textbooks. The Department also recognizes with gratitude the continuing support received from the Canadian National Institute for the Blind, for two graduate students and for the purchase of equipment. It congratulates the C.N.I.B. on the inception of the Col. E. A. Baker Foundation devoted to the advancement of ophthalmic science.

The Department welcomes Dr. Clive B. Mortimer to the active teaching staff and regrets the resignation of Dr. W. R. F. Luke. In general, the morale of the Department has been good and the wholehearted support which has been offered to the new Head is gratefully acknowledged.

### RESEARCH

Members of the staff have engaged in the following research work.

Dr. R. C. French and Mrs. Z. Duma, using radioactive isotopes, are tracing the protein metabolism in the various anatomical layers of the rabbit cornea. This is under a National Health Grant for "Biochemical Studies of the Cornea."

Under the National Health Grant, "Eye Bank and Corneal Transplantation," Dr. P. K. Basu continued his studies on the problems of corneal grafting and vitreous implantation with the assistance of Drs. G. M. Cobb, D. M. Dorsey, Mr. F. Carre, Mrs. I. Fielding and Mrs. L. Schubert. A comprehensive study on the cytology of the cornea and vitreous tissues is continuing. Dr. Basu, with the assistance of Dr. P. Sarkar of the Department of Botany, is studying the Karyology of normal cornea as well as that of corneal grafts and diseased cornea. Employing diffusion chamber techniques they have been able to show that a heterologous cat cornea can remain viable in the rabbit's cornea for more than six weeks without showing any chromosomal change. Mrs. I. Fielding and Dr. Basu are experimenting on the soluble protein fractions of the vitreous using disc electrophoresis. Dr. Cobb and Dr. Basu are testing the effect of 6-mercaptapurine on the control of immunological reaction in corneal grafts. Dr. Dorsey and Dr. Basu are studying the cytology of vitreous cells and have been able to culture these cells *in vitro*. Dr. Basu and Mr. F. Carre have succeeded in the growth and subculture of corneal epithelium of beef in tissue culture.

Dr. N. Wine and Dr. Basu are studying the healing of corneal tissue *in vitro*. Dr. C. McCulloch and Dr. Basu are studying the survival of endothelial cells of the cornea implanted interlamellarly. With the assistance of Col. H. Pierce of the Orthopaedic Division, Dr. Basu is studying the tissue reactions of different experimental plastic materials implanted in the cornea. Dr. Basu and Dr. S. Sabnis, a Colombo Plan Fellow from India, in the Department of Pathology, are studying the relation between the blood group antigens and the corneal antigens. Dr. T. M. Sibay and Dr. Basu are continuing their research on the production of experimental tumours in animal eyes. By injecting tumour cells from Walker carcinosarcoma 256 into the carotid artery of rats they have been able to produce ocular and orbital tumours. Dr. Basu, with the assistance of Dr. T. P. Morley and Mrs. M. Preissig of the Department of Neuro-Surgery, are attempting to grow human brain tumours in the ocular chambers.

Mrs. A. Wolf in conjunction with the Canadian National Institute for the Blind has been energetically obtaining eyes for the Eye Bank of Canada (Ontario Division). At the Eye Bank Laboratory in the Banting Institute, under the supervision of Dr. Basu, the donor materials are examined and processed before they are distributed to the surgeons for corneal grafting and vitreous implantation. The Corneal Clinic which has been established in the Toronto General Hospital under the direction of Dr. G. A. Thompson with the collaboration of Dr. C. McCulloch, Dr. Basu and Dr. W. P. Callahan, is working once every month. The purpose of this clinic is to investigate the cause of certain corneal lesions and to evaluate the indications for the use of frozen corneal donor materials and to compile data concerning the overall results of corneal grafting.

Under a Medical Research Council Grant awarded to Dr. Basu, Dr. N. Wine, in collaboration with Dr. A. G. Gornall of the Department of Pathological Chemistry, is conducting an investigation on the Intraocular Penetration of Steroids. It has been found that following local injection there is little penetration of the drug through the scleral coats of the eye.

Under a Defence Research Board Grant Dr. L. D. J. Chisholm has worked with Mr. J. F. Foley of the Defence Research Medical Laboratories on certain effects on

colour vision produced by noise. The changes discovered have been quite variable. Apparently this is a complex psychosensory phenomenon which differs from person to person.

Under a National Health Grant, "Clinical Investigation of Idiopathic Retinal Detachment," Dr. M. Shea is directing a retina clinic at St. Michael's Hospital. With the assistance of Dr. D. M. Dorsey he has been studying improvements in the investigation and treatment of retinal detachment. He has been working on changes in the optics of the light coagulator to improve the versatility of that instrument. Also, under this grant a retina clinic has been started at the Toronto General Hospital under the direction of Dr. Clive B. Mortimer. He has commenced studying the strength of the retinal scar produced by various degrees of retinal light burns.

The National Health Grant for "Studies on the Prevention and Treatment of Ocular Complications of Diabetes" was continued under the direction of Dr. H. R. Hausler. This project is jointly undertaken by the Departments of Ophthalmology and Physiology. Dr. Hausler and Dr. Sibay are attempting to produce a retinopathy in diabetic animals. A hamster has been bred which spontaneously developed diabetes. They are also using animals which have been rendered diabetic, either by alloxan or by the surgical removal of the pancreas. With this material they have been trying many variations in environment and chemical or metabolic insults to produce a retinopathy. They have developed excellent techniques to visualize the fine details of the retinal vessels. At the Toronto Western Hospital a special eye clinic for diabetics has been set up, where Dr. Hausler is conducting double blind studies of agents which may alleviate diabetic retinopathy.

The National Health Grant for "Prevention of Blindness from Glaucoma" was continued under the direction of Dr. W. R. F. Luke at the Glaucoma Clinic at the Toronto General Hospital. Dr. Luke has been studying special cases of glaucoma, particularly "pigmentary glaucoma." He has been assessing the value of tonography in the diagnosis and control of this disease. Dr. J. S. Speakman has been studying certain groups of glaucomatous patients who show degenerative changes in the anterior segment of the eye. He feels these rather widespread changes are part of the over-all glaucomatous disease and he is collecting examples of each change. He has been developing equipment to photograph the angles of the anterior chamber of the eye. Dr. Speakman, with the assistance of Dr. T. S. Leeson of the Department of Anatomy, has been studying the structure of the angle of the anterior chamber in normal and glaucomatous eyes. They have found a degenerative swelling of the trabecular fibres in the region, which they believe may be a common cause of chronic simple glaucoma. This work has aroused considerable interest and is being repeated in a number of other centres. Miss Susan Hennighausen is continuing tonography in the glaucoma laboratory and also runs the tonometer testing station. At the First Glaucoma Conference in Ottawa, the clinical use of tonography was discussed at length and a number of other laboratories to do tonography are being set up across Canada. Miss Hennighausen visited Dr. Elmer Ballantine in Cleveland to see the latest developments in this field. Dr. W. R. F. Luke, with Dr. L. D. J. Chisholm, has been analysing the levels of certain serum enzymes in glaucomatous patients. Dr. R. K. MacDonald has developed a method of differential staining to visualize the outflow channels from the Canal of Schlemm. He has also been developing special setons to form drainage channels for use in operations on glaucoma.

Under an Atkinson Foundation grant, Dr. D'Arcy K. Macdonald has been developing the use of scleral contact lenses for the treatment and restoration of sight in certain patients with special ocular diseases. These contact lenses are different from the type commonly worn and are designed for wear only in certain cases.

Dr. J. S. Crawford has been continuing his research on ptosis at the Sick Children's Hospital. At the Toronto General Hospital he has directed a special clinic for squint and has increased it by the addition of an orthoptist, Miss L. Silva-White. A similar clinic, at the Western Hospital, is run by Dr. B. Teichman. Dr. Teichman has also continued work on improved operations for obstruction of the lacrimal

passages. At Sunnybrook Hospital he has been studying glaucoma in aphakia. Dr. G. A. Thompson has been analysing the use of frozen corneae for therapeutic corneal grafting. He has continued to take a special interest in cancer of the eye, particularly in diagnosis using P32. Dr. J. C. Hill and Dr. J. D. Morin have completed a study of the growth of the skull in the region of the orbit. This is of value in the planning of plastic procedures near the eyes. Dr. R. E. Groshaw, at Sunnybrook Hospital, has been analysing the incidence of cataract in patients receiving steroids. Dr. W. G. Hutchison has been following the details of the changes in the fundus after occlusion of fine, branch, retinal vessels. Dr. L. A. Lloyd has continued her work in neurology and has enlarged the work of the neuro-ophthalmology clinic at the Toronto General Hospital.

### OPHTHALMOLOGY

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- ANDERSON, D. L. and SHEA, M. "Tissue Response to Polyvinyl Alcohol Implants in Rabbits" (*American Journal of Ophthalmology*, vol. 51, no. 6, June, 1961, pp. 1200-3).
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- COLLYER, R. T. and HAZLETT, BARBARA E. "Retinopathy and Neuropathy in One Hundred Growth-Onset Diabetic Patients" (*Canadian Medical Association Journal*, vol. 85, no. 25, Dec. 16, 1961, pp. 1328-34).
- CRAWFORD, J. S. "Papilloma of the Lacrimal Sac" (*American Journal of Ophthalmology*, vol. 51, no. 6, June, 1961, pp. 1303-4).
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- ELLIOT, A. J. "Non-Surgical Treatment of Traumatic Diplopia" (*Eye, Ear, Nose and Throat Monthly*, vol. 40, no. 9, Sept., 1961, pp. 619-22; *Transactions of the Canadian Ophthalmological Society*, vol. 24, 1961, pp. 170-6).
- FRANKLING, S. R. "A Study of Reading Difficulties in Toronto School Children" (*Canadian Medical Association Journal*, vol. 85, no. 5, July, 1961, pp. 237-41).
- HARRIS, G. S. "Alpha-Chymotrypsin in Cataract Surgery" (*Canadian Medical Association Journal*, vol. 85, no. 4, July, 1961, pp. 186-8).
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- "Observations on the Microaneurysms of Diabetic Retinopathy" (*Diabetes*, vol. 10, no. 6, Nov.-Dec., 1961, pp. 452-4).
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- McCULLOCH, C. and HUNTER, W. S. "A Search for Ocular Anomalies in Persons with Abnormal Numbers of Sex Chromosomes" (*Canadian Medical Association Journal*, vol. 86, no. 1, Jan., 1962, pp. 14-16).
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## OTOLARYNGOLOGY

*Under the direction of Professor P. E. Ireland*

The graduate teaching programme of the Department of Otolaryngology has continued on the four-year basis which was initiated last year. There has been a gradual integration of those already given posts in the course. This has presented no great difficulty and one is encouraged by the number of applicants who wish to join in the graduate teaching in our specialty. The inclusion of a year of general surgery has meant a marked improvement in the effectiveness of those in the final year of clinical endeavour. The undergraduate training is now largely by a block system in the various hospitals although the main group is still being given weekly lectures for a fixed period at the Toronto General Hospital. This is partly at the request of the undergraduate students who feel that in the block system they are divorced in their contacts with the other members of the final year class. They quite appreciate the opportunity of meeting in a central area for lectures given by this Department and of course by other departments, on a weekly, one hour basis. We still feel that it would be unwise to give this group of lectures in a block system with complete training in an individual hospital.

The Department has been, during the past two years, making a brave attempt to establish a research centre in our specialty. One of the great difficulties seems to be the overcrowding which we have experienced and the deficiency in space within the Banting Institute for any projects for which we have sufficient funds. This, however, is a general problem throughout the Medical School and it is hoped that with the new research building now being planned, this will be resolved. We have continued with the work under Dr. J. Farkashidy which is supported under a M.R.C. Grant. In addition to this we have Dr. Elizabeth McKee, working in vestibular research at St. Michael's Hospital under a National Health Grant. The Alcoholism Research Foundation has again been generous with a donation in support of a research project on the effect of alcohol on the labyrinth, both as to hearing and vertigo. Working on this is a Japanese scientist, Dr. Yuichi Nito who has a Ph.D. as well as a Master's Degree in Biochemistry. Dr. Nito has had considerable experience with research problems in the United States and Japan and it is hoped that useful information will come from this project.

We have been most fortunate this year in being able to have in our laboratories Professor Gosta Dohlman of Lund, Sweden. He was in Canada as a visiting professor under the Medical Research Council and was supported by funds from this source. He spent a total of six months working in our laboratories and aiding greatly in the projects that are being conducted here and also in the Defence Research Laboratories at Downsview. Several papers are in process of preparation with regard to these investigations on the human labyrinth and invitations have been given to present these at the American Otological Society, the American Academy of Otolaryngology and, this summer, at the Collegium in Athens, Greece. We were very fortunate in having Professor Dohlman with us and he and his wife both proved to be very charming visitors. An application has been made to the National Institutes of Health, Washington, for his return next year and it is sincerely hoped by all that it will be granted. He has already spent two years of research in Bethesda, Maryland, with this organization.

The course in Speech Pathology and Audiology has continued to have the support of our Department in the branch of Audiology. This course is now well established and a second graduate is to be employed by the Toronto General Hospital in the Audiology Centre. In addition, we have added in this centre a technician who will spend part time on this project and the remainder in vestibular testing.

The Vestibular Unit at St. Michael's Hospital continues under the direction of Dr. Walter Johnson of this Department and the Department of Defence Research Medical Laboratories. The equipment in St. Michael's Hospital is almost the finest

to be found anywhere and is also being employed on a small project for the testing of drugs used in the control of vertigo. This is in addition to its use in the broad field of vestibular research, here and in association with Defence Research Medical Laboratories, in the problems of vertigo and disorientation. This large project has kept Dr. Johnson in communication with the group in the United States which is working on Project Mercury. Although no publicity has been given out at the present time, one may safely say that a considerable contribution has been made to the flight of the astronauts by this group, which also includes Dr. Brydon Smith, and that at least some of the credit of successfully putting man into space must come to them. A similar unit to that in St. Michael's Hospital is to be installed in the Toronto General Hospital for the clinical testing of vertigo.

The work at the Institute of Radiotherapy has been under the able supervision of Dr. D. P. Bryce. He has been successful with the Department of Rehabilitation Medicine in providing at last a prosthetic laboratory which has been set up in the Princess Margaret Hospital. Mr. Brazier has been brought from England and with his help defects due to surgery or radiation in our field can now be successfully dealt with. The speech clinic for the laryngectomized patient has been increased by one more teacher, and the speech therapists in the various hospitals have been induced to conduct their training of this group under what is known as the Princess Margaret method of speech.

During the past year we have been most successful in obtaining funds for the launching of a project in case finding of deafness in very young children, and the continuing study and education of such small patients. Adequate funds have been obtained from private sources to ensure the study of the virus of measles with an attempt to isolate this virus. Funds are also set up for a method of case finding of deafness in infants and very young children. As very little has been done in this regard this is both a clinical and a basic research problem. We will be assisted in this work by Professor John Scott of the Department of Physiology. Owing to the generosity of the Atkinson Foundation, the Children's Hospital has received funds suitable for setting up a five-year project on the training of these deaf children by special methods such as high power binaural hearing aids. This is to be done in addition to the usual hearing clinic and speech clinic which is already successfully operating in the Hospital for Sick Children under the direction of Dr. J. B. Whaley.

Many members of the staff have taken part in the activities of various scientific meetings in Ontario. Dr. W. F. Goodman gave papers at Queen's University, Kingston, North Bay, and Sudbury. Dr. Page Statten gave a series of lectures to the postgraduate course in Speech Pathology and Audiology. He was also appointed Consultant in auditory disorders at the Ontario Crippled Children's Centre. Dr. J. B. Whaley was on the program of the American Chest Society at their Toronto meeting and assisted in the Department of Public Health Course in November last, and also in the postgraduate course in Pediatrics for general practitioners. Dr. Blair Fearon gave a paper at the International Congress of Otolaryngology in Paris last summer and has published several papers. Professor P. E. Ireland attended the International Congress in Paris in August, 1961, and presented a paper. A paper was also presented at the same meeting by Dr. Walter Johnson. Dr. Joseph A. Sullivan, former Assistant Professor in this Department, continued his support to the Department. Notwithstanding his position as a member of the Senate of Canada and the Board of Governors of the University, he still continues his activities in otolaryngology. He has been elected President this year of the Otological Society which is considered an honour both to him and to this Department. Dr. P. E. Ireland has been elected President of the Canadian Otolaryngological Society.

It is with regret that we announce the retirement of Dr. G. C. Snell who has served thirty-one years with this Department. We extend to him the thanks of everyone on the staff and wish him many years of future happiness. There has been added to the Department, Dr. T. D. R. Bryant, who is at the present time spending a year at the Fearon's Research Institute in London, and will be returning to a staff appoint-

ment on January 1st, next. Dr. Alexander Fee of the Toronto Western Hospital has been promoted to the rank of Associate.

The Head of the Department wishes to thank all of the staff for their co-operation during the past academic year and to include in this the Research Fellows, technical staff and the secretaries who are associated in the details of administration.

### RESEARCH

One of the difficulties in the co-ordination of research has been the fact that the projects have been in many widely distributed centres. The over-all co-ordinator has been, as before, Dr. Walter H. Johnson, who is also associated with Defence Research Medical Laboratories and the Department of Physiology of the University. Under his direction there is good co-relation between the laboratories at the Defence Research, the Banting Institute, the Vestibular Centre at St. Michael's Hospital and the Toronto General Hospital. It would be a great help if these could be integrated into a common area, but this seems impossible at the present time.

Dr. Joseph Farkashidy continues under a renewed Medical Research Council Grant to study the organ of Corti and peripheral vestibular receptors with the aid of the electron microscope. The efferent innervation of the vestibular end organs has been demonstrated by histochemical methods and intracellular fixation. There has also been under investigation the ototoxic effect on the labyrinth of certain antibiotic drugs. This consists of the insertion of electrodes in the acoustic nerve and the study of the action potentials followed by serial recordings. The animals were later sacrificed and the labyrinth dissected for electron microscopy. This work was assisted by Dr. T. D. R. Bryant and Dr. R. Black in the Department of Neurophysiology in the Best Institute under Dr. J. W. Scott.

With the arrival of Dr. G. F. Dohlman from Sweden, many different aspects of labyrinthine physiology were studied by the use of radioactive tracer techniques, combined with electron microscopy. The secretion and absorption of the endolymph, the regeneration of the vestibular crista after experimental removal of the cupula, and the localization of the peripheral colinergic nerve endings in the eighth nerve receptors are at present being investigated by the administrative and selective absorption of different radioactive substances. A paper on this work was given at the International Congress in Paris during August and further presentations are to be given at the Collegium in Athens, Greece, the American Academy of Otolaryngology in Las Vegas, the American Triological Society in Pittsburgh, and the American Otological Society in Miami, Florida.

Dr. Yuichi Nito from Osaka, Japan, continues the work on alcohol research under the grant from the Alcoholism Research Foundation. He is an excellently trained scientist who has had many years of experience in the United States and Japan. He is now engaged in the effects of alcohol on the vestibular apparatus and also upon the intracranial structures by histochemical and pathological methods. Dr. Walter Johnson continues his clinical research at the Defence Research Medical Laboratories and St. Michael's Hospital. This has special significance as it is also sponsored by Project Mercury of the United States and has given many useful basic principles to this working group with regard to man's orientation in space flights. Along with Dr. Brydon Smith, they have been studying the saccular otolith regarding its function in cats in the relation to balance. Dr. Elizabeth McKee is working under Dr. Johnson on the effects of whiplash injuries as a cause of vertigo in animals. Certain drugs that have special value in suppressing labyrinthine stimulation are also being tried both by animal and by human experimentation by this same group of investigators.

A new research project which is really in three parts has been made possible through a generous gift by an anonymous donor to this Department and the assistance of the Atkinson Foundation. This is to consist first of an attempt to isolate the virus

of measles, which is one of the very damaging factors in the development of congenital deaf mute children. Deafness occurs when the mother has measles before the birth of her child. Research on this subject is being conducted under Professor Rhodes of the School of Hygiene. The second part of the project is an attempt to find means of assessing deafness or diminished hearing in infants or very small children. It is known that, in order to have them progress in the development of speech, the diagnosis must be made in the first six months of life. An attempt is being made to assess this through electro-encephalography and this project will be conducted with help from Professor John Scott of the Department of Neurophysiology. The third part of this research project is a five-year pilot scheme of attempting to produce speech in these deaf or hard of hearing children who up to now have had no training before three years of age. This pilot scheme is under the sponsorship of the Atkinson Foundation and is being conducted at the Hospital for Sick Children where already research is being done in the investigation of hard of hearing children.

Dr. Douglas Bell continues his research on allergy along with the Department of Medicine and the Division of Allergy at the Toronto Western Hospital. This is a correlation of our present knowledge of allergy with the various manifestations that one finds in our specialty. At the Toronto General Hospital, Dr. H. O. Barber is continuing his investigation of vestibular problems as related to special diagnosis and treatment in head injuries and neurosurgical cases. There is presently to be installed a complete vestibular investigation unit in this hospital for which space has already been supplied and plans completed for equipment and installation.

### OTO-LARYNGOLOGY

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- FEARON, B., BRIANT, T. D. R. and COMET, V. "Esophageal Hiatal Hernia in Children" (*Transactions of VIIth Pan-American Congress of Oto-rhino-laryngology and Broncho-oesophagology*, 1961).
- FEARON, B., MCKENDRY, J. B. and PARKER, J. "Abscess of the Nasal Septum in Children" (*Archives of Otolaryngology*, vol. 74, no. 4, Oct., 1961, pp. 408-12).
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### PAEDIATRICS

*Under the direction of Professor A. L. Chute*

The problem of integrating undergraduate, graduate, postgraduate teaching and research into a smoothly running programme, and at the same time providing the best care for sick children, is one which requires constant revision.

One of the major problems to be faced in this area is the requirement by the College of Physicians and Surgeons that all rotating internes, of which there are 140 in our teaching hospitals, must include paediatrics in their training. This points up once again the desirability of developing good paediatric services in association with

adult general hospitals. Concentration of children's services in one large institution has certain advantages. However, disadvantages may arise when it is required to fulfil a multitude of collaborative functions, not with one but with a number of other individual and independent teaching institutions.

The department has continued to co-operate with the graduate division of the Faculty in assisting with its annual postgraduate course for those preparing for the examinations of the Royal College. In addition two refresher courses for general practitioners and one advanced two-week course for paediatricians have been conducted. The demand for this type of course is increasing and it is proposed to have three sessions for general practitioners in the coming year.

It has been a source of great satisfaction that we have been able to obtain as Director of the Research Institute of the Hospital for Sick Children a world recognized scientist in the person of Dr. Stanley Hartroft.

We are pleased that Dr. Robert Ehrlich, having completed his postgraduate training at Cambridge University, has joined our research staff in the Department of Endocrinology.

Dr. John Darté has relinquished his appointment with the Princess Margaret Hospital to become the Director of Haematology. Dr. P. D. McClure will be associated with him in this service after some further training in the United Kingdom.

Dr. Robert Slater resigned his appointment to become Dean of the Faculty of Medicine in Vermont.

A number of members of the staff delivered lectures outside the University. Dr. J. D. Keith was guest speaker at the Milton Rogers Heart Foundation, St. Petersburg, Florida. Dr. Wm. Hawke conducted a symposium on cerebral palsy for the World Commission on Cerebral Palsy in Vienna. Dr. H. Bain was guest speaker at a post-graduate course in Obstetrics and Paediatrics in Regina, and at the College of General Practice in Charlottetown, P.E.I. Dr. Collins-Williams was guest speaker at the British Association of Allergists in Cambridge, England.

## RESEARCH

As pointed out in earlier reports all research in the Department of Paediatrics is conducted under the auspices of the Research Institute of the Hospital for Sick Children.

The following hold full-time appointments in the Institute in addition to their appointments in Paediatrics. Dr. A. Sass-Kortsak has continued his studies on copper metabolism in children with Wilson's disease. He is also studying the metabolism of the red blood cells of the newborn child. Dr. D. Fraser is pursuing his investigations in the fields of calcium metabolism, especially in children who suffer from a variety of skeletal diseases of metabolic origin. He is also continuing his interest in the field of protein chromatography. Dr. Paul Swyer is developing methods for studying the respiratory and cardiac problems which occur in the early newborn period. Dr. Robert Ehrlich is perfecting the methods of measuring growth hormone by the haemagglutination technique. He has also initiated a study of the factors concerned in controlling the labile diabetic.

The following have part-time appointments in the Research Institute as well as holding an appointment in Paediatrics. Dr. J. Keith directs a series of studies on various aspects of congenital heart disease with particular interest in the development of pulmonary hypertension in cases of ventricular septal defect. He is also undertaking an analysis of electrocardiographic findings following corrective surgery of cardiac defects. Dr. D. McLean is studying the virus etiology of a number of conditions in particular the encephalitides. Dr. T. E. Reed is planning a continuation of previous studies on the genetic relationships of various blood group factors to the incidence of fertility and stillbirth.

The following clinicians also utilize the facilities of the Research Institute. Dr. C. Collins-Williams has conducted a study on the development of haemagglutinins

in ragweed sensitive asthmatic children. Dr. J. S. Prichard and Dr. Gauk have been studying the electroencephalitic changes occurring in breath-holding children. Dr. H. Bain and Dr. A. Rebhan have continued their studies on reactive hyperglycaemia in diabetic children. Dr. J. D. Bailey and Dr. K. Fullerton have continued their studies on pituitary dwarfs and the effects of human growth hormones. Dr. W. Hawke is assisting the West End Creche in a study of the needs of the mentally handicapped children. In association with Dr. P. Rastogi he is also following the cases of phenylketonuria and the results of placing them on low phenylalamine diets.

### PAEDIATRICS

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- MCLEAN, D. M. "Infections of the Central Nervous System Requiring Emergency Treatment" (*Journal of Pediatrics*, vol. 28, Dec., 1961, pp. 1020-3).
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### PATHOLOGICAL CHEMISTRY

*Under the direction of Professor James A. Dauphinee*

During the session 1961-2 some 148 undergraduate students in the third year of their medical course attended the lectures and laboratory classes given in Pathological Chemistry and 11 graduate students have also been working in the Department. Of this latter group, 8 were registered with the School of Graduate Studies as candidates for the Ph.D. degree, 2 were registered for the B.Sc. (Med) and 1 was a special student.

In the lectures, laboratory periods and seminars given to the medical students a continually increasing effort is being made to correlate the knowledge of fundamental biochemistry and physiology acquired in earlier courses of basic science, with the study and understanding of patients and their diseases. Separate sections of the lecture course are devoted to a consideration of the various abnormalities of water and electrolyte metabolism, renal function, hepatic function, gastrointestinal function, carbohydrate and protein metabolism and to discussions of the disturbances in endocrine function which may be met with in the human patient, either as primary phenomena or as secondary manifestations of some medical, surgical, obstetrical, paediatric or other condition. The work in the laboratory is as closely correlated as

possible with the lecture course and in this part of their instruction each student is provided not only with suitable simulated specimens of blood and urine from one of a number of different patients suffering from the type of illness currently being discussed in the lectures, but also with a summary of the history, physical findings and other pertinent clinical information about this particular patient. When the laboratory determinations have been completed, the student is required to write up the patient he has studied and he is asked to correlate the biochemical abnormalities found with the clinical findings, and to explain the way in which these abnormalities have been brought about, their clinical significance and the steps that may be taken to correct them. Finally all the patients who have been studied during a given period are presented in detail by the students at small group seminars where all the aspects of the clinical problem and the significance of the findings are thoroughly discussed and explored. It is felt that this has been a most satisfactory way of teaching our subject and it is hoped that in the future it will be possible to have a number of physical changes made in our student laboratory which will facilitate more intensive small group instruction.

No major changes have taken place in our professorial staff but we have welcomed the addition of Dr. Aaron Malkin to our ranks as Lecturer, on his appointment to the position of Head of the Department of Biochemistry at Sunnybrook Hospital, D.V.A. Along with Dr. John Porter of the Toronto General Hospital, Dr. A. Rapoport of the Toronto Western Hospital, Dr. Sandford Jackson of the Hospital for Sick Children and Mr. O'Sullivan at St. Michael's Hospital, Dr. Malkin will help to make sure that our students will be kept well acquainted with all the numerous new developments in Hospital Biochemistry, one of the divisions of our subject which has been expanding at an almost terrifying rate during the past few years.

Various members of our staff have also taken part in the teaching in a number of the advanced graduate courses which have been offered by the Division of Post-graduate Medical Education of our Faculty; among these courses are included the six weeks Advanced Graduate course held each August and September for Fellowship candidates and others, the series of five o'clock lectures given to the internes in the Toronto General Hospital and the annual two-week intensive course of instruction given to medical graduates on the use of radioactive isotopes. This latter course, which has been very successful and usually considerably oversubscribed, has been developed, organized and supervised by Professor Paul, and is designed to be of assistance to those physicians who wish to obtain a licence to use radioactive isotopes in the investigation, diagnosis or treatment of human patients.

## RESEARCH

*Reported by Professor James A. Dauphinee*

In association with Dr. Paul Walfish and the Clinical Investigation Unit of the Toronto General Hospital and with Dr. Holvey and the Clinical Investigation Unit at Sunnybrook Hospital, Dr. Dauphinee has pursued his quantitative studies of the different factors which play a part in the development of ascites in patients with cirrhosis of the liver, and of the effectiveness and mode of action of the various diuretic drugs which can be used to treat or to control this serious complication of the cirrhotic patient. There is seen to be a definite synergistic effect between the action of the diuretic chlorothiazide drugs and the aldosterone antagonists when given to these patients and this at times is further augmented by the administration of prednisone or other steroid therapy. These findings probably indicate a different site or mode of action of the two types of drugs in the renal tubule. The observation, originally made elsewhere, that the simultaneous administration of "Polysorbate" or "Tween 80" will increase the diuretic effectiveness of the aldosterone antagonist of spironolactone, presumably by increasing the extent of its absorption, has been confirmed and this means, of course, that a much smaller dose of this expensive

drug than that heretofore necessary can be used to produce a maximum anti-aldoosterone effect.

In collaboration with Dr. J. C. Richardson and other members of the neurological staff of the Department of Medicine, Mr. C. E. Downs and Dr. Dauphinee have continued their investigations of the disturbed Copper Metabolism in patients suffering from hepatolenticular degeneration or Wilson's disease. The markedly improved prognosis of these patients when treated with adequate chelation therapy would seem to make early diagnosis very important. It would appear that a quantitative measurement of the 24-hour urinary copper excretion (much higher in these cases than in normal persons or in other patients) is the most satisfactory method of confirming the diagnosis in patients with this disease by chemical means although as a general rule they also show a marked decrease in the serum ceruloplasmin and the total serum copper concentration as well. Using these chemical criteria the diagnosis of this disease has been established in two further patients and ruled out in a wide variety of others who were showing suggestive but not typical neurological symptoms. In the proven cases chelation therapy with orally administered penicillamine has increased the copper excretion in the urine many times, and when continued over extended periods has caused very definite and encouraging clinical improvement.

Dr. Barry A. Tobe has continued his work on the metabolism of the volatile bases. He has assessed the clinical significance of the free ammonia content of blood and has found that this level is of value in the diagnosis of hepatic encephalopathy. This work was presented in preliminary form to the meeting of the American Society for the Study of the Liver in Chicago in November, 1961, and in a completed form to the meeting of the International Association for the Study of Liver held in Munich in May, 1962. In association with Dr. D. Wood of the Department of Therapeutics he has initiated a study of the possible importance, in the investigation of haematological disorders, of the increase in the ammonia content which takes place in blood after it has been shed. The preliminary data are interesting and indicate that such an investigation could give considerable information about the metabolism of amino acids, peptides and other nitrogenous compounds by the red blood cells. With the co-operation of Dr. B. Goldman of the Department of Surgery he has studied the effect of diuretics and sedatives on the metabolism of ammonia by the liver and the possible role of such medication in the pathogenesis of hepatic coma. The initial results indicate that these drugs do significantly interfere with the metabolism of ammonia, permitting the blood ammonia level to rise and facilitating thereby the occurrence of hepatic encephalopathy. He has also developed a simplified microaeration technique to measure blood ammonia levels and he has initiated studies of the possible significance of ammonia in the clotting of blood and in certain immunologic reactions.

Miss Margaret DeWolfe, in association with Dr. Sanford Jackson of the Hospital for Sick Children, has continued her studies of the  $\alpha_2$  macroglobulin of human blood and has succeeded in preparing a relatively pure sample of this material from blood plasma by a combination of cold alcohol fractionation, starch block electrophoresis and DEAE cellulose chromatography. She has determined the amounts of this protein present in the blood of normal individuals at different ages and in patients with various illnesses and she has followed quantitatively the increases in the concentration of this plasma fraction which occurs in the blood of rats after the experimental production of the nephrotic syndrome in these animals by the administration of either anti-kidney serum or amino nucleoside.

Miss Amy Britton has continued her investigations, with Dr. Ezrin and Dr. Walfish of the Department of Medicine, of the binding of the thyroid hormones (triiodothyronine and thyroxine) to the plasma proteins and she has succeeded in obtaining a reasonable separation of the thyroxine-binding globulin by starch gel electrophoresis. The quantitative and qualitative aspects of thyroxine binding in disease states and in conjunction with the degradation rate of thyroxine are being further investigated.

*Reported by Professor T. F. Nicholson*

Mr. L. A. Wright has continued his investigations on the site and mode of excretion of amino acids by the kidney. He has shown that, particularly in the distal tubule, the formation of peptides by the kidney plays a significant role in the renal handling of amino acids, and that the increased excretion of amino acids which occurs in certain renal lesions, both experimental and clinical, is due to the loss by the kidney of its ability to form peptides.

Dr. A. Dewitt Baines has been investigating, by histochemical means, the changes which occur in the quantity and distribution of enzymes in damaged kidneys. He has improved the methods for the determination of glucose-6-phosphatase and ATPase so that he gets more consistent results than can be obtained by the published methods. He has shown that there is a species and age difference in the type of regeneration that follows renal tubular damage. Dr. Baines has also found that during regeneration of epithelial cells of any part of the nephron there is hypertrophy of the cells of the parietal layer of Bowman's Capsule next to its junction with the proximal tubule and that these hypertrophied cells have the histological and enzymatic characteristics of the cells of the first part of the proximal tubule. In a specimen of kidney tissue obtained by renal biopsy from a case of vitamin D refractory rickets Dr. Baines found a great diminution in the intracellular content of acid phosphatase.

Drs. Rapoport and Nicholson have been investigating the effects of ligation of a single branch of the renal artery on certain renal functions and have found that although the glomerular filtration rate may be reduced markedly following ligation of the renal artery the excretion of sodium is usually unaffected while that of potassium tends to follow the creatinine clearance.

*Reported by Professor A. G. Gornall*

In the Fellows' Laboratory Dr. Velta Cernavskis has continued her study of the plasma protein fractions that bind hydrocortisone and is attempting to elucidate their significance. Mr. D. Ostrovsky has been investigating the effect of salt intake on the vascular response of rats to angiotensin and aldosterone. Dr. D. J. Gare has ruled out magnesium deficiency, triiodothyronine and parathormone as possible potentiating factors during the chronic administration of aldosterone in rats.

Dr. S. L. Cohen has explored methods of extracting steroid conjugates and studied the factors potentiating enzyme hydrolysis of pregnanediol glucuronide in urine. Mrs. H. Pavuls and Mrs. E. Kuhn have assisted with this work and also performed other analyses required in the Clinical Investigation Laboratory.

In the Steroid Hormone Laboratory Mrs. C. Gwilliam has been in charge of the chromatography of aldosterone and its metabolites and has been assisted by Mrs. D. Neufeld. Mrs. M. Cohen has prepared the urine extracts. Mrs. M. Kandel has been responsible for isotope measurements and the estimation of aldosterone secretion rates.

Preliminary studies of aldosterone secretion in renal hypertensive dogs have been made with the help of Dr. H. Basian, Department of Surgery.

In collaboration with Dr. N. Wine, Department of Ophthalmology, a study has been made of the intraocular penetration of hydrocortisone following subconjunctival injection.

The following problems have been under study during the year in collaboration with clinical departments: (1) Aldosterone excretion and secretion in patients with hypertension and hypokalemia and the effect of aldosterone antagonists—with Drs. J. C. Laidlaw, D. Killinger, R. Volpé and E. R. Yendt, Department of Medicine. (2) Aldosterone excretion and secretion in patients with "idiopathic" edema—with Drs. C. Ezrin, and D. Killinger, Department of Medicine. (3) Effects of a new progestational agent (BDH-1298) in normal women, amenorrhoeic women and patients with endometriosis—with Drs. T. A. Doran and J. L. Harkins, Department of Obstetrics and Gynaecology.

The generous support of the Medical Research Council of Canada and the Ontario Heart Foundation is gratefully acknowledged.

*Reported by Professor William Paul*

The biophysical laboratory of this department is used by a number of other departments of the Faculty of Medicine for the storage and measurement of radioactive isotopes. However only the problems which entail active participation of our laboratory personnel will be reviewed here.

Phosphorus 32 continues to be used for direct Geiger counter localization of neoplasms in the eye by Dr. G. A. Thompson of Ophthalmology and in the brain by Dr. T. P. Morley of Neurosurgery.

The problem of determining the position of space-occupying lesions in the brain by external localization has been expanded into a joint investigation with the Department of Medical Biophysics. During the past year a study of the usefulness of employing serum albumin labelled with radioactive iodine for this purpose has been completed and as a result the scanning of patients for brain tumours with radioactive serum albumin will soon become a routine procedure. Attention is now being turned to the development of new techniques for brain scanning using other tracer materials and more effective methods of detecting and recording the results. With the aid of a grant-in-aid from the Ontario Cancer Treatment and Research Foundation a start in this direction has already been made with empirical evaluation of positron localization by an array of small photo-multipliers arranged in banks of coincident pairs.

The colorimetric measurement of blood oxygen as a research problem was renewed only last year in this laboratory after a long period of dormancy and measurements of oxygen saturation in humans by oximetry is again the subject of investigation. Preliminary bench experiments indicate that recently improved electronic components may be used to effect radical changes in Oximeter design thus bringing about an increase in the stability of the instrument. Construction of a new oximeter for investigation in the Cardio-Respiratory Laboratory (Department of Medicine) is under way.

## PATHOLOGICAL CHEMISTRY

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## PATHOLOGY

*Under the direction of Professor A. C. Ritchie*

The undergraduate teaching programme continued as in the past, except that in the first part of the session the students in the third Medical year were divided into

groups and taught in the various associated hospitals. In the second part of the session, they were instructed as a class in the Banting Institute. On the whole, the latter system seems to be preferable.

The lack of a satisfactory examination in Pathology at the end of the third Medical year continues to be a handicap. It seems illogical, and perhaps unfair, to set the final examination in Pathology at the end of the second Medical year, before the course is finished. Nevertheless, the continuation of instruction in Pathology into the third Medical year remains very desirable, and it is hoped that modifications to be introduced will augment its value.

The undergraduate courses in general pathology for Dental students, and the courses for students of Physiotherapy were continued as in past years.

The load of graduate teaching remains heavy. The staff assisted in the work of the Division of Postgraduate Medical Education, giving instruction in Pathology both to those training in clinical work and to those training in Pathology. Members of the staff have also participated in the refresher course for coroners under the auspices of the Attorney General's Department, and in the courses arranged by the Canadian School of Embalming, and by the Toronto Institute for Pastoral Training.

It has become clear that if the various courses of instruction offered by the Department are to be developed and extended, as they should and could be, more staff is needed. The load of teaching and routine work is already such that the majority of the senior members of the Department find it difficult or impossible to give time to the investigative work which should be an important function of the Department.

Space also continues to be a limiting factor. The facilities for research in the Department are overcrowded, and modifications to provide more accommodation are urgently needed. In addition, the facilities provided by the Department for the autopsy service of the Toronto General Hospital are antiquated, and grossly inadequate.

Professor Ritchie and Professor Steiner lectured at McGill University. Professor Movat took part in a symposium on allergic inflammation at the meeting of the American Association of Pathologists and Bacteriologists at Montreal. Dr. D. W. Thompson addressed the Canadian Association of Pathologists at Winnipeg.

It is with regret that the resignation of Professor H. J. Barrie is recorded. Professor Barrie was for fifteen years a member of the staff of the Department, and has contributed a great deal to its development and progress. He will be remembered particularly for his services to the autopsy service. We wish him all good fortune and happiness for the future.

We are also sorry to have to note the retirement of Miss V. L. McKinnon and Miss N. W. Simpson. All who have spent any time in the Department will know how great were the services rendered by Miss McKinnon and Miss Simpson, and will understand the loss we have suffered. We hope that they will both find their years of retirement happy and fruitful.

Dr. J. S. Carruthers is also leaving the full-time staff of the Department, but fortunately is taking up a position at the Wellesley Hospital, and will remain a part-time member of the staff. Dr. M. J. Phillips joins the full-time staff in Dr. Carruthers' place.

Dr. Bernard Lennox of the Department of Pathology, University of Glasgow, visited the Department and spoke on "Medical Education at Glasgow—Present Status and Proposals for the Future." Professor E. Letterer of the University of Tübingen, also visited the Department.

#### RESEARCH

The increasing use of electron microscopy has made inadequate the facilities available to the Department. Funds are available to permit the purchase of three new instruments, and a suitable room in the Banting Institute is being prepared to house them.

In addition, a new mouse room is being constructed, to permit the continuation of studies of experimental epidermal carcinogenesis, and of the implantation of metastases, to be carried out under the direction of Professor Ritchie.

Professor Movat and Professor Steiner, in collaboration with Dr. Huhn have completed their studies of the fine structure of the mammalian glomerulus. It was shown that the mesangium is an extension of the smooth muscle of the afferent arteriole. With Dr. R. J. Slater and Dr. E. R. Yendt they have completed an electron microscopical study of acute and chronic glomerulonephritis. Work on the progression of the acute condition to the chronic is continuing.

With Dr. N. V. P. Fernando, Professor Movat has completed studies on the fine structure of the terminal vascular bed, and of connective tissue. On this basis, the changes occurring in the first fifteen minutes of allergic inflammation have been studied in the rabbit's mesentery. It was shown that antigen-antibody complexes are precipitated in the lumen of the blood vessels, and that then separation of adjacent endothelial cells occurs, with the deposition of immune precipitates in the gaps so formed.

Working under Professor Movat's direction, Mr. W. J. Weiser has begun a study of allergic inflammation in the vascular cornea, and of the Arthus phenomenon in animals rendered leukopenic with nitrogen mustard.

Dr. G. A. van Erkel has studied the fine structure of the frog's web, to provide a basis for the study of inflammatory changes in this tissue.

In co-operation with Dr. S. R. Kalifat, Professor Steiner and Dr. Carruthers have continued their electron, fluorescent and light microscopic studies of the liver. Emphasis was placed upon the elucidation of the fine structural alterations which result from ligation of the common bile duct. Retrograde injections of electron-opaque particles into the biliary tree served to show the routes of escape of bile constituents, clarifying the much disputed question of the mechanism of jaundice in extrahepatic cholestasis.

In collaboration with Mr. R. Baumal and Mr. M. Cooper, Professor Steiner commenced studies on the production of liver injury by intrabiliary injections of antigen-antibody complexes. An investigation of the fate of transfused homologous spleen cells and their rôle in the development of destructive lesions of the liver of runting neonatal mice was also commenced.

Professor Steiner and Dr. Carruthers have continued their studies of the morphology of the hyperplastic and metaplastic biliary epithelial cells, which proliferate in the livers of rats given  $\alpha$ -naphthyl isothiocyanate or ethionine.

Professor W. Anderson has continued his study of degenerative changes occurring in the region of the shoulder. He has found that extensive alterations are often present in people who have no disability, and that in some cases these alterations are as severe as those found in patients complaining of serious limitation of movement. He is also studying radiation changes in bone, and with Dr. S. Gordon is studying the use of dermografts in the aorta, and the repair and transplantation of tendons.

Dr. Thompson is continuing his studies of circulating tumour cells, in collaboration with Dr. N. Delarue.

Professor Ritchie and Dr. Susan Ritchie are collaborating with Dr. R. C. Long and Dr. J. W. Hopkirk of McGill University in a similar study being carried out in Montreal.

In the Hospital for Sick Children, Professor Donohue in collaboration with Dr. P. E. Conen has continued their study of the chromosomes of malignant tumours of children, and other aspects of cytogenetics.

Dr. Sass-Kortsak has continued his studies on copper metabolism in health and disease.

Dr. R. J. MacKay is continuing to collaborate with Professor A. M. Fisher of the School of Hygiene on experimental pneumoconiosis and lung tumours with aluminum and silica dusts.

Many members of the Department have prepared reports of cases or groups of cases, alone or in conjunction with members of other Departments.

## DIVISION OF NEUROPATHOLOGY

*Reported by Professor J. Olszewski*

The undergraduate teaching continued as in previous years. Though the number of failures in the portion of the final examination related to Neuropathology was moderate, the over-all quality of answers was not impressive. Inadequate attention paid by the students to the laboratory work may be partially responsible for this mediocre response.

The formal postgraduate teaching consisted of diagnostic slide sessions conducted by Professor Tom, of demonstrations in neurohistology organized by Professor Olszewski and of clinical pathological conferences which were attended by neurologists and neurosurgeons, both staff and residents. We wish that a time more convenient for the clinicians could be arranged for these latter conferences. In addition, several research conferences have been organized, at which current research projects have been discussed. Some of these sessions were held jointly with the staff of Professor Scott's Laboratory of Neurophysiology. The Journal Club was continued as in the previous year.

In spite of the constant financial struggle, we achieved several important improvements in the physical state of the Division. The histological laboratory was moved to a new, renovated, large room. More space for fellows was provided. A new room for brain cutting and storage was obtained in the sub-basement. A room was equipped with an air-conditioner and was dust-sealed to provide suitable conditions for ultra-thin sectioning for electron microscopy.

The task of supervising the routine diagnostic service for the Toronto General Hospital fell, as in the previous years, on the shoulders of Professor Tom, and as in previous years has been performed with unsurpassed excellency. It is, however, a sad reflection on the state of Canadian neuropathology that though at present several positions for neuropathologists are open in the country, there seem to be no properly trained people to fill them.

Dr. N. B. Rewcastle, MRC Fellow, obtained his M.A. degree and is continuing in the School of Graduate Studies towards the degree of Ph.D. We welcome warmly Dr. H. Wisniewski from the Polish Academy of Sciences, Warsaw, who joined our group in November for one year of postgraduate training. Dr. C. Baglio spent a year in our laboratory and is returning shortly to the United States to continue his training in neuropathology.

Dr. J. Humphrey's laboratory of muscle pathology has proved to be a most valuable addition to our Division. We have also been very fortunate in having Dr. Ezrin's laboratory of the study of the hypophysis form a part of our Division.

The Division has been visited by several distinguished guests. Professor R. Hassler from the Max-Planck Institute in Germany spoke on "Disorders of Automatic Movements in Parkinsonism." Dr. L. Levy from South Rhodesia described his experiences as a neurosurgeon in that country. Professor H. Koenig from the University of Illinois spoke on "New Aspects of Glial Metabolism." We were also very happy to be hosts to the Annual Meeting of the Canadian Association of Neuropathologists, which took place in June.

Members of the staff attended various scientific meetings or delivered lectures.

PROFESSOR TOM: Several cases for diagnosis, Canadian Association of Neuropathologists, Toronto; Case for diagnosis, American Association of Neuropathologists Slide Session, Atlantic City.

PROFESSOR OLSZEWSKI: Spread of sodium fluorescein in the normal brain tissue, IV International Congress of Neuropathology, Munich; Hypertrophic degeneration of the inferior olive, Cajal Club, Minneapolis; Study of the vascular permeability in the hypothalamus, American Association of Anatomists, Minneapolis; Vascular permeability of the hypothalamus and area postrema studied by autoradiograph techniques, Department of Neurology, University of Minnesota; Toxic and metabolic disease of the nervous system, American Academy of Neurology, New

York; Studies of the vascular permeability in the hypothalamus, American Association of Neuropathologists, Atlantic City.

DR. REWCASTLE: Electron microscopy of the nervous system, Ontario Association of Pathologists; (with Dr. J. G. Humphrey) Vacuolar myopathy, Academy of Medicine, Toronto; Subacute Cerebellar Degeneration associated with Hodgkin's disease, Canadian Association of Neuropathologists, Toronto; Electron microscopy of striated muscles, Canadian Association of Neuropathologists, Toronto.

DRS. REWCASTLE and K. BERRY: Multiple haemorrhages associated with non-hypertensive intracerebral arteriolar sclerosis, Canadian Neurological Society, Winnipeg; Tumours of the spinal cord, Academy of Medicine, Toronto.

In view of the planned building of an addition to the Banting Institute, we are greatly concerned with the allocation of space for various laboratories of neurological sciences. It would be of the greatest advantage if all these laboratories were as close to one another as possible. On the other hand, we must remain an integral part of the Department of Pathology. The solution will be a compromise—but it is important to achieve as favourable a compromise as possible and this will not be obtained without a careful planning.

We welcome Professor Ritchie as Head of the Department and are confident that his understanding of research and teaching problems and his administrative talents will be a help for the further development of the Division.

We were very sorry to lose a good friend and a trusted co-worker in the person of Dr. H. J. Barrie. Our best wishes go with him in whatever endeavour he will decide to give his talents.

#### RESEARCH

Professor Tom in collaboration with Dr. Loughheed, Department of Neurosurgery, has studied changes in dog brains exposed to regional extracorporeal hypothermia.

Professor Olszewski and Dr. Wisniewski studied the vascular permeability in the region of the hypothalamus and the area postrema using iodinated radioactive albumen and autoradiography. They are continuing the investigation of neuronal changes secondary to interruption of the axon.

Dr. Rewcastle has studied cerebral oedema by electron microscopy. An investigation of hypertrophic degeneration of the inferior olive was renewed after several months' interruption. A recent publication describing this change in cats spurred our interest.

Dr. Baglio has studied by electron microscopy the glial head of the spinal roots and the area postrema.

Dr. Wisniewski has investigated the changes in the choroid plexus induced by the injection of silicon into the subarachnoid space or the ventricular system.

Dr. Ezrin has continued his studies of anterior pituitary cells as defined by special stains. In addition, he has shown that in dogs the sodium-excreting effect of chlorthiazole is abolished by damage to the proximal portion of the distal renal tubule.

Dr. Humphrey has continued his investigation of neuromuscular diseases. Histochemical methods and (in collaboration with Dr. Rewcastle) electron microscopy have been used in addition to routine techniques.

Several projects based on current or old casuistic material have been undertaken. In addition to those mentioned above, the following have been undertaken. Drs. Berry and Olszewski: case of central pontine myelinolysis; pathological lesions in the spinal roots after intrathecal injection of Phenol. Dr. Turnbull: a genesis of the internal carotid artery; a case of pigmented meningioma. Dr. Wisniewski: haemorrhage and necrosis in the hypophysis.

Four medical students, J. Chapnik (Lederle Scholarship), M. Ball, J. Ireton and A. Gross worked in the Division during the summer vacation.

## PATHOLOGY

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## PHARMACOLOGY

*Under the direction of Professor E. A. Sellers*

The Department offers lecture and laboratory classes to the second Medical year, the second Dental year and to the fourth year of Pharmacy. In addition a course in Toxicology and a graduate course in Pharmacology are given. Because of the increase in number of Dental students, the laboratory classes were split into two sections. In the case of Medical and Pharmacy students this reduplication of laboratory periods has existed for some years.

Trends referred to previously relating to undergraduate and graduate teaching and to research have continued. These developments are an extension of the tutorial or small group method of instruction to medical students, an extension of the use of research staff not paid by the University for teaching, and an extension in scope and type of research effort. It seems unlikely that in the immediate future continued extensions in these directions will be possible. Limitations of space, facilities, and contemplated increases in numbers of students place physical barriers on progression of these trends. Therefore one might examine the desirability and importance of each trend.

*Tutorial or small group method.* With large numbers of students this would seem to be the only way of following the progress of an individual student during the year. It is believed that a considerable proportion of teaching should be to small groups.

*Use of research staff not paid by University for teaching.* It appears self-evident that the teaching and methods of teaching if justified, should not be dependent on financial support from non-University sources. With present teaching commitments and methods, it is. The staff student ratio in this (and in related departments) is much lower than is desirable.

*Scope and type of research.* For some years an interest in genetic factors which modify the anticipated actions of drugs has been maintained. Work in this field has many important clinical applications. It is gratifying to report that Dr. Nancy Simpson, who received her training in "human genetics," has been appointed a Queen Elizabeth II Scientist in the Department and will be working in this field. Relating to this same field, a monograph on "Pharmacogenetics" by Professor W. Kalow will appear early in the autumn.

Collaborative studies are being carried out with the Departments of Medicine, of Surgery, of Psychology, the Hospital for Sick Children, the Ontario Alcoholism

and Drug Addiction Research Foundation. Once again the Laboratory of the Attorney General of Ontario, and the Defence Research Medical Laboratories, have made members of their staffs, and their facilities, freely available to us during the year. Professors K. I. Melville and R. E. Birks of McGill University, Professor C. W. Gowdy of the University of Western Ontario and Professor H. Remmer of the Free University of Berlin participated in the Graduate Seminar programme. Professor David de Wied (Groningen) visited and collaborated in a research project in the Department for a short period.

At the beginning of the session it was a pleasure to welcome Dr. Rosemary Hawkins as an Assistant Professor in the Department.

Members of the staff presented papers before the Canadian and American Federations of Biological Sciences, a meeting sponsored by the National Academy of Sciences (United States), the International Congress of Pharmacology in Stockholm, as well as local societies. Members of the staff continue to serve on a variety of national and international editorial and advisory boards or committees concerned with this scientific discipline.

The importance of drugs in the economic aspects as well as practice of medicine appears to be increasing steadily. There is need for larger numbers of well-trained pharmacologists. To meet this demand, and our increasing teaching commitments, more space and more staff are badly needed.

Graduate students have completed the following theses:

*For the M.A. degree:*

ECOBICHON, DONALD J. Properties and classification of the soluble esterases of human liver.

METSKI, MISS MALL. Energy metabolism in the hypothermic rat.

*For the Ph.D. degree:*

MARTON, ANDREW VICTOR. Toxicity of the organophosphorus insecticides.

## RESEARCH

In Professor E. A. Sellers' section, and in collaboration with the Department of Therapeutics, Dr. W. J. Russell Taylor has evaluated three respiratory stimulants (nikethamide, prethcamid and caffeine) both on animals and with patients. Prior to this study, patients having chronic chest disease (usually emphysema) with acute carbon dioxide narcosis were treated by tracheotomy and intermittent positive pressure respiration. Unfortunately a high mortality (50 per cent) is associated with this method. Nikethamide has proved to be the most suitable of the three agents studied during the past three years, and is regarded as the treatment of choice in selected cases. An evaluation of ethamivan and DW-62 is proposed using nikethamide as a base-line for comparison. A clinical evaluation of metaraminol bitartrate in association with anticholinergic agents has continued.

Professor Sellers and Professor E. Schönbaum are continuing a study of the goitrogenic effect of thyroid hormones. An explanation of this anomalous effect may throw light on the control of thyroid secretions and the causation of hitherto unexplainable thyroid diseases. The active collaboration of Drs. C. Ezrin and R. Volpé of the Department of Medicine has been most helpful. In this project good progress has been made in the development of two assay procedures for thyrotrophic hormones.

The problems of regulation of body temperature and adaptation to cold are being studied intensively. Our primary interest is in the effect of drugs on temperature regulation, and the alteration in drug action produced by changes in temperature. The autonomic nervous system and "autonomic drugs" have received major attention. Dr. G. E. Johnson has observed that large doses of nor-adrenaline interfere with the ability of the rat to maintain its body temperature during exposure to

cold. It is our impression that this is the result of excessive stimulation of  $\alpha$  receptors, because the effect can be blocked by dihydroergotamine and phenoxybenzamine, while it is increased by dichloroisoproterenol. The implications of this finding on the metabolic basis of homeothermia are being further explored. Miss M. Metski has examined the metabolism of carbohydrates and lipids of rats exposed to cold. Dr. John Evans, the Department of Medicine, has very kindly collaborated in this work by studying the utilization of labelled fatty acids by cardiac muscle obtained from animals adapted to cold.

With Dr. W. G. Bigelow of the Department of Surgery collaborative studies on problems related to hibernation and hypothermia are continuing.

Dr. Francisco Eng, with Professor Sellers, has continued an investigation of experimentally produced atherosclerosis. The effects of *d*- and *l*-thyroxine, diets, and some autonomic drugs, on cholesterol levels and on production of lesions have been studied.

Under the direction of Professor G. H. W. Lucas, Dr. C. Fabierkiewicz has continued her research on the identification of tranquillizers and has found that in urine of patients taking large doses of chlorpromazine the drug or its metabolites can be precipitated by use of mercuric chloride. The precipitate when dissolved gives a solution which shows a typical colour reaction with bromine in strong sulphuric acid. The presence of the metabolites of secobarbital appear to interfere with this colour reaction. A paper outlining this study was presented at a meeting of the Forensic Society of Canada in November in Toronto.

Dr. Frances Lettau and Dr. Madelaine Maykut made progress in the study on the effect of cyclopropane on cardiac irregularities using rats and rabbits as the experimental animals. It was found that those animals are not suitable laboratory animals for such research. Dr. Lettau's work was considerably hampered by a serious illness in the autumn. At the present time gas chromatography is under study as a means of analyzing anaesthetic gas mixtures.

Research under the direction of Professor W. Kalow has continued in several fields. Observations on the action of muscle relaxants led to studies of the blood supply of neuromuscular endplates. Mr. T. Konop continued his efforts to isolate a naturally occurring relaxant of human plasma. Mr. D. Ecobichon observed differences of electrophoretic motility between two human plasma cholinesterase variants after removal of sialic acid from the enzyme proteins. He also separated and characterized esterases of human liver. Mr. P. Sadowski studied the kinetics of alkaline phosphatase from patients with hereditary hypophosphatasia. Dr. A. Marton continued investigations on the "subclinical" intoxication of rats during chronic administration of an organophosphorus insecticide; most significant are observations on damage to fetuses and infant animals. Dr. Nancy Simpson studied the contribution of heredity on control of esterase levels of human plasma; in co-operation with the Hospital for Sick Children she investigated hypoglycaemic children with view to devising pharmacological tests which will permit the collection of genetic data. She has also assisted the Canadian Diabetic Association set up a programme for the genetic assessment of diabetes. Investigations on phenylketonuric patients, were continued in the hope of finding a biochemical link between a primary genetic defect and resulting mental retardation; a decrease of urinary catecholamines has been found in these patients.

In Professor H. Kalant's section, research has continued along the two principal lines indicated in last year's report. Dr. Rosemary Hawkins has completed a study of steroid hormone production by adrenal glands from rats suffering acute alcohol intoxication. Adrenal stimulation was demonstrable only if the blood alcohol level rose very rapidly, but did not occur when the alcohol was absorbed at normal rates despite the attainment of high blood alcohol levels. This work is now leading to an exploration of the mechanism of selective action of alcohol on the function of the diencephalon.

With the able assistance of Mrs. W. Mons, and the collaboration of Dr. R.

Murray of the Department of Biochemistry, work has continued on the mechanisms of normal cell adhesion and tumour metastasis. Liver tumours induced by butter yellow have been found to contain an abnormally high proportion of neuraminic acid which, unlike that in normal rat liver, is released by the action of bacterial sialidase. This finding may provide an explanation for the lack of calcium-binding by tumour cells, for their lack of adhesiveness, and for the lack of effect of calcium-chelating agents on their metabolic behaviour *in vitro*. Mr. Robert Hickie is testing this hypothesis by observing the effects of perfusion with versene on the exchange of radioactive calcium in normal and tumour-bearing livers.

### PHARMACOLOGY

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### PHYSIOLOGY

*Under the direction of Professor Charles H. Best*

The new wing of the Charles H. Best Institute was completed during the past year and the Department of Physiology was pleased with its new student laboratory and additional research space. The student laboratory, accommodating about 45 students, relieved the congestion in the practical classes and simplified the arrangement of the practical work. At a time when all classes are increasing, this is of particular importance. The new quarters for research in Neurophysiology and for the application of tracer techniques should be mentioned especially. These sections, planned by the staff that will use them, will make possible new projects and increased productivity in research. During the 1961-2 session five meetings of the University of Toronto Physiological Society were held, at which papers were presented by scientists from the United Kingdom, the United States, Denmark and this University. One of these meetings was the occasion of a lecture by Dr. J. Steinke, of Harvard University, delivered under the auspices of the School of Graduate Studies. Other speakers were Drs. A. M. Rappaport, R. B. Holmes and H. O. Stolberg, "Hepatic Venography"; Dr. A. Tybjaerg Hansen, University of Copenhagen, "The Measurement of Colloid Osmotic Pressure in Plasma and Blood"; Sir Rudolph Peters, University of Cambridge, "Some Recent Work on Ancient Poisons"; Dr. K. L. Manchester, University of Cambridge, "Actions of Insulin on Protein Metabolism."

The following addresses were given by members of the staff. Professor J. CAMPBELL, on "Hyperlipidaemia with Keto-acidosis" at a Brook Lodge Symposium on Lipid Metabolism. Dr. H. R. HAUSLER, on "The Ocular Complications of Diabetes" at the Toronto Diabetes Association; on "The Aneurysm of Diabetic Retinopathy" at the Academy of Medicine, Section of Pathology, Toronto; on "Diabetic Retinopathy" at the Buffalo Ophthalmologists Club; on "Therapeutic Attempts for Diabetic Retinopathy" at the Research Meeting of the Department of Ophthalmology, University of Toronto. Professor G. HETENYI, Jr., on "Effects of Insulin on Glucose Production, Utilization, Accumulation Rates and 'Space' in Dogs Determined by a Validated Tracer Method" before the American Diabetes Association, New York; on "Effects of Insulin on Glucose Production and Distribution in Liverless Dogs" before the Canadian Federation of Biological Sciences, Guelph, Ontario; on "New Frontiers of Research in Diabetes and Insulin" before the Kitchener-Waterloo Branch of the Canadian Diabetic Association. Professor A. M. RAPPAPORT, by invitation, on "The Anatomical Pattern of Hepatic Lesions" at the Department of Pathology, University of Jerusalem, Israel; on "Experimental Hepatic Coma" and presented an "Exhibit on Liver Structure" at the 5th World Congress of Jewish Physicians in Jerusalem; on "Anatomical Pattern of Hepatic Lesions" (the 1962 "Ludovic Hektoen Memorial Lecture") at the Hektoen Research Institute, Cook County Hospital, Chicago, Illinois. Professor J. W. Scott, on "The Electrical Activity of the Brain as Modified by Cooling" at the meeting of the Neuroanaesthesia Group of the Section of World Neurology, at Bethesda, Maryland. Professor O. SIREK, on "Serum Glycoproteins in Newborn Infants of Diabetic Mothers" at the Meeting of the International Diabetes Federation in Geneva.

Graduate students have completed the following theses:

*For the Ph.D. degree:*

- BLUMENSTEIN, J. "The enzymic interrelationships of choline and methionine glycine methyltransferase."  
 GORMAN, C. K. "An investigation into the effects of glucagon on lipid metabolism in the rat."  
 LOGOTHETOPOULOS, J. "Physiological and histochemical studies on zinc-containing tissues."  
 POTVIN, P. "Observations on the metabolism of ammonia in the dog, with special reference to hepatic circulation."

#### RESEARCH

In Professor R. E. Haist's section, Dr. Margaret J. Henderson has studied arterio-venous glucose differences and is now beginning an investigation of the relation of body temperature to the accumulation of free glucose in tissues. She has also observed the effects of hypothermia on the diabetes following alloxan. Miss A. L. Haxton has continued her studies on the effect of hypothermia on the action of glucagon, insulin and other agents. Dr. M. A. Ashworth has modified the procedure for inducing hypothermia in such a way that some indication of changes in heat production can be obtained. Dr. J. K. Davidson has studied the effect of tolbutamide on islet volume in hypophysectomized rats, and is starting investigations on the insulin content of the pancreas. With Mr. D. E. Nickerson he will be investigating effects of certain steroids on the islets in hypophysectomized rats. Miss A. L. Haag has completed her study of the effect of the adrenal glands on the action of dithizone, a zinc-chelating agent, on blood sugar level. Mrs. G. V. Nash has assisted with studies on the living islets of the mouse and fresh tissue preparations of the pancreas of rats.

Professor F. C. Monkhouse, with Miss Pamela Way and Mrs. Linda Kabot has studied factors affecting release and metabolism of Clearing Factor Lipase (CFL). It was found that fasting rats had decreased levels of CFL. Irradiated rats had higher levels than their pair-fed controls at a period following treatment concurrent with

that reported for maximum adrenal cortical activity. The effect of cortisone injection and adrenalectomy is being studied. Heparin levels of tissues are also being measured in these animals. CFL levels and duration of effective levels, following heparin administration by the subcutaneous, intramuscular and oral routes are being measured and compared. Mrs. Susan Milojevic, with Professor Monkhouse, is continuing work on the purification and characterization of plasma antithrombin. Its role as a normal anticoagulant and as a heparin-cofactor is being studied.

Dr. Donald Hopkins is investigating the role of plasminogen (profibrinolysin) activators which, on the basis of preliminary experiments, are released during clotting or thrombin formation. The part played by plasmin inhibitors present in all normal plasmas is also being studied.

In Dr. J. W. Scott's section, Dr. D. Briant developed techniques for placing electrodes on the eighth nerve of the cat which permit prolonged observations. Dr. R. G. Black, Mr. R. Hayward, Dr. S. Bedwell and Mr. R. Swirsky have developed a mechanical device to measure the resistance of human skeletal muscle to passive movement. Mr. Ronald Swirsky, a graduate student from the Faculty of Applied Science and Engineering, is using the data obtained with this equipment in a study of control mechanisms in biological systems. Mrs. Avery Hughes developed and tested microelectrodes for measuring secretion potentials of cells of the islets of Langerhans. Dr. Black is continuing his study of the spinal portion of the trigeminal nucleus.

In Dr. J. Campbell's section, the metabolism of adipose tissue has been studied with Dr. A. D. Martucci and Mr. G. R. Green. New knowledge of the effects of insulin and glucose on this tissue has been obtained; and the lipolysis-stimulating activities of a large number of hormones have been quantitatively determined with this tissue, by a method developed in this laboratory. Alterations in the metabolism of adipose tissue, produced by diabetes, by fasting, and by adrenalectomy, have been studied. With Dr. K. S. Rastogi and Mrs. V. Lazdins, a metachromatic colour reaction of a dye with the A chain of insulin has been investigated and found to be non-specific.

Drs. H. R. Hausler, T. M. Sibay and Miss B. Stachowska have continued their studies on the ocular complications of diabetes. This research is conducted jointly with the Department of Ophthalmology. These investigations are concerned with the mechanism of production of diabetic retinopathy in experimental animals and also the observation of eye changes in animals which develop diabetes spontaneously.

In Professor A. M. Rappaport's section, research is continuing on the effect on hepatic circulation of ammonium salts infused by various routes into the liver. In a study with Dr. G. Hetenyi, Jr., the blood flow values obtained by the B.S.P. (Bromsulphalein) method are being compared with those calculated from the simultaneous uptake of injected colloidal radioactive gold ( $\text{Au}^{198}$ ). In co-operation with Dr. E. Llewellyn-Thomas, measurement of portal and hepatic arterial blood flow is being attempted with an electromagnetic flowmeter before and during infusion of ammonium acetate into the liver. Dr. M. Kaneko is pursuing the study of changes produced in the liver by the continuous infusion for four weeks of a non-inebriating dose of alcohol into the portal system. He is also investigating the changes in angioarchitecture of the liver produced by a severe choline deficient diet in rats. Dr. Rappaport modified Hédon's technique of a two-stage pancreatectomy and is helping Dr. G. A. Wrenshall in his tracer studies of the *immediate* effects of total removal of islet tissue in the dog. The joint research with Dr. R. B. Holmes of the Department of Radiology on hepatic venography has been extended to renal venography.

In Professor D. W. Clarke's section, Miss C. J. Miller has completed her studies on some of the factors which affect the glucose uptake of the epididymal fat pad. Hypophysectomy reduces the glucose uptake of the tissue, but does not alter the response to insulin. Adrenalectomy seems to increase the sensitivity of the tissue to insulin; cortisone has the reverse effect. Work is continuing on the assay of insulin in blood, and on the effects of certain proteins on the response of isolated tissues to insulin. Mrs. E. Vertes is studying the effects of alcohol in cerebral metabolism, and

work is continuing on the problem of measuring the heat production of isolated muscle tissue.

Professor O. Sirek, in collaboration with Dr. A. Sirek, has continued to study the behaviour of the carbohydrate moiety of serum proteins in offspring of normal and diabetic animals. The rise in concentration which was observed during certain phases of growth and development appeared to be linked with the process of differentiation of serum proteins and was not related to actual growth in terms of new formation of connective tissues.

An effect of insulin on the accumulation of free glucose in the liver cells *in vivo* was demonstrated by Dr. G. Hetenyi and Mr. G. Arbus. In spite of the considerable difference of the concentrations of hepatic and plasma glucose after insulin the rapid exchange of glucose continued through the cell membrane. In non-anaesthetized adrenalectomized dogs the increased sensitivity to insulin was shown to be due to an increased response in the peripheral utilization of glucose. In collaboration with Professor Wrenshall, problems of tracer methodology are being studied.

During the past year, Dr. W. J. Linghorne has continued his experimental study of osteogenic repair. For many aspects of this process only purely descriptive or morphological data exist. A paper describing the progress made in the development of a physiological basis for problems in the repair of bone is being prepared.

During the past year, Professor J. Markowitz has been occupied largely with revising the book *Experimental Surgery*, in collaboration with Professors J. Archibald and H. G. Downie of the Ontario Veterinary College, Guelph. In addition, in collaboration with Professor Archibald and Dr. J. Alexander, at Guelph, he is studying the feasibility of using the canine heart-lung preparation for the perfusion of the whole body (canine), to permit isolation of the heart and direct vision surgery of this organ.

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## PSYCHIATRY

*Under the direction of Professor A. B. Stokes*

The Royal Commission on Health Services has provided, over the past academic year, both a stimulus and an opportunity to examine the position of university medical faculties in the evolving patterns of medical and hospital care. From the standpoint of university departments of psychiatry it has been possible, for the first time in Canada, to offer a comprehensive report on mental health services as they are, and

as they need to be if the right to health is accorded the psychiatrically ill. In particular all university departments of psychiatry are concerned to produce more graduates, of a quality equal to their specialist responsibilities.

The concern, when translated into action, involves onerous tasks and formidable difficulties. Nonetheless effective movement has already taken place and will continue with increasing momentum if greater resource is available to maintain tenacious purpose.

Psychiatry must, in a sense, compete with other specialist medical disciplines in attracting young graduate physicians to its field of endeavour. Reasonable competition is a healthy circumstance of vocational opportunity but the opportunity must be made evident in terms of a high quality studentship and good facilities for practice.

In Canada, in 1951, there was one qualified psychiatrist for 58,000 of population in 1956 the ratio was one per 41,000, in 1960 1 per 30,000. The increasing psychiatrist-population ratio is representative of a more forceful educational effort over a decade when technical advances have stirred vocational interest and subsidized facilities have provided a modicum of opportunity. Even so the Canadian figure is below that of the United States., of the USSR, and of Great Britain and in all these countries the necessity is not met by the supply. It seems likely that a realistic satisfaction of need would be attained by a ratio of one psychiatrist per 10,000 of the population: at this ratio 1800 psychiatrists would be practising in Canada now rather than 600.

Taking into account the increasing Canadian population and the loss of practising psychiatrists by death, retirement, and so forth, the average output from the university graduate divisions each year, to achieve a ratio of one psychiatrist per 10,000 of population by 1970, would be about 200, in contrast to the present 50. Careful consideration of the educational facilities, as they exist now and as they might be expanded without sacrificing quality, would indicate that the 1 in 10,000 objective by 1970 is unattainable. At most a doubling of the present number is possible in the decade.

Logistics of this sort serve as an index of current need as well as of objective. Training posts are required for each of these students in hospitals, clinical services, clinical laboratories, etc. at a remuneration appropriate to a reasonable modest subsistence. The graduate students are in their late twenties or early thirties with eight to eleven years of professional education behind them—at least three-quarters of their number will be married. The financing of these student services in the clinical field cannot be borne by the universities directly but will be possible only by an appropriate expansion of services in the metropolitan areas which contain the universities.

However, training posts imply university teachers. Many of these teachers will be holding unpaid staff appointments at general hospitals; many will be holding salaried posts at psychiatric or mental hospitals; a meagre few will be holding remunerated full-time academic posts within the Universities. More full-time university posts are essential for healthy growth, to maintain a high standard of instruction and to stimulate research developments.

Theory and the testing of theory by planned inquiry and investigation distinguish a university department from a trade school. In Psychiatry, the development of a firmly based body of knowledge, from which more effective treatment techniques will emerge, is particularly important. The need for more psychiatrists should not obscure or impair the greater necessity to illuminate the dark places of ignorance by understanding. This kind of responsibility for the future connotes financial resource appropriate to a trusteeship of knowledge and competence.

Over the academic year 1961-2 *the undergraduate medical courses* of instruction were again revised in accordance with the long-term policy of bringing the medical student into direct personal contact with the mentally ill patient. A more structured first and second year will be followed by a more intimate clinical experience in the third and fourth years. Already the revisions of the past two years have been associated with a better standard of performance in the written, clinical and oral examinations of the graduating class.

*Graduate instruction* has been greatly strengthened in the third and fourth years. The number of training posts for graduate students in Psychiatry has been increased still further within the training network of University and University-affiliated hospitals and clinics. With this increase much needed concentrations of study have been made possible, particularly in the areas of child psychiatry, forensic psychiatry and community psychiatry. More senior training posts are required in the psychiatric divisions of the teaching general hospitals.

The number of graduate students in the Department was 67, including overseas fellows and Colombo Plan graduate students. In the Diploma Examination 20 were successful. Of past diplomates, 20 gained the specialist certificate in Psychiatry of the Royal College: 2 obtained the Fellowship of the Royal College by examination.

The graduate course in *Child Psychiatry* for third- and fourth-year students has attracted a deal of interest. Five candidates are enrolled, two have completed the course successfully.

The *Mental Retardation* services of the Toronto Psychiatric Hospital have been initiated in the children's division; research into the causes of mental retardation has continued collaterally with the services. Dr. L. T. Hilliard, a distinguished British specialist in mental retardation, of international renown, has been appointed as Visiting Professor and has taken up his post. A field of medicine, hitherto neglected, has shown a vital potential for growth. Such progress will allow better instruction to medical graduates and undergraduates on the problems of mental retardation and the involvement of other professional workers and the community in the developing scene.

In May, 1962, the *American Psychiatric Association* held its 118th Annual Meeting in Toronto. The University Department of Psychiatry was honoured by the visit of a number of international guests who contributed, through discussion and argument, to the thinking of both teachers and graduate students.

Throughout the academic year many distinguished psychiatrists from abroad have lectured in the Department and conducted seminars: vice versa many senior members of the academic staff have delivered lectures or contributed to seminars in other University centres. Such academic interchange is a criterion of health and vitality.

The *library facilities* have been bettered by the addition of a research reading room and a seminar room. Some increase of *laboratory space* has been contrived in a building already full to the degree of space saturation. However such difficulties of overcrowding are temporary. The plans of the new *Psychiatric Institute* have been completed and it is hoped that tenders and construction will not be long delayed.

It is a pleasure to record indebtedness to the Provincial Department of Health, the McLaughlin Foundation, the Atkinson Memorial Foundation, the Nuffield Foundation, the Medical Alumni Association, the Group for the Scientific Study of Mental Retardation, the Ontario Association for the Mentally Retarded, the Medical Research Foundation and a large number of friends and donors in private life.

The Department of Psychiatry has continued to enjoy those strong interdepartmental supports which make a medical faculty a matrix and a university a whole. Wise counsel and constructive criticism have been available at all times, as an essential ingredient of growth in collegueship.

## RESEARCH

Research activities in the Department of Psychiatry have continued to range over wide territories from the anatomical to the social. Here and there in positions deemed strategic, because of particular elements in the pattern of illness, small groups of workers have revealed a tenacious curiosity, seeking answers to emergent questions. Their focussed efforts, in a variety of circumstances, have been a major stimulus to the over-all growth of the Department.

Anatomical studies on the limbic lobe system under Dr. M. SLOANE have continued to attract interest. Dr. J. W. LOVETT DOUST has pursued his investigations

into biological clocks and their relevance for psychiatry. The properties of one such clock have been studied with special attention to the defects in its timing mechanism which characterize patients with schizophrenia and patients with organic brain syndrome. The influence of psychotropic drugs on this mechanism has been investigated and it has been shown that drugs affecting pacemaker systems within the subcortex are also those which affect alerting responses and affectivity in the schizophrenic. The developmental aspect of this biological clock has been investigated and a study involving healthy children in age between infancy and adolescence has shown that autonomic and metabolic monitors of periodicity in schizophrenia correspond in their frequencies to those of the young child.

Dr. Lovett Doust with Mrs. E. Fox has estimated capillary blood lactate to demonstrate that a similar biological clock exists in the intermediate metabolism of cellular carbohydrate, thus supporting the view that a reversible relative tissue anoxia exists in schizophrenia.

With Mr. I. PODNIEKS Dr. Lovett Doust has demonstrated by suitable psychological tests cycles of vigilance in a variety of psychiatric patients. These cycles have been investigated in parallel with autonomic and metabolic procedures in an attempt to reveal a possible temporal concordance.

With Mr. L. KELTZ an attempt is being made to monitor simultaneously a growing number of electrophysiological functions in the resting subject to discover time relationships and mutual dependence.

Dr. P. H. MELVILLE, Dr. H. C. STANCER and Mr. B. EGLITIS are studying cyclic shifts of nitrogen metabolism in patients with a 3-6 week spontaneous exacerbation of psychotic behaviour. Attention is being focussed on catechol amine excretion (Mrs. V. Grant) and for serum transaminase and C-reactive protein changes (Miss J. Molin). Dr. Melville is inquiring into fluid and electrolyte balance and weight changes as they relate to behaviour; he is also studying calcium balance by using radioactive calcium in conjunction with the Department of Medicine.

Dr. E. BAKER, at the Toronto Western Hospital, is investigating the rate of sodium transfer from serum to CSF using Na 22 in depressives and non-depressives, before and after electro-convulsive therapy.

The UNIVERSITY-PROVINCIAL DRUG RESEARCH COMMITTEE (Dr. A. Bonkalo, Dr. D. J. Lewis, Dr. P. G. Lynes, Dr. A. Miller, Mr. R. L. D. Wright, and Dr. J. W. Lovett Doust) has been active in screening several unmarketed psychotropic drugs at the Toronto Psychiatric Hospital, the Ontario Hospital, Toronto, St. Michael's Hospital and the Drug Research Unit at the Ontario Hospital, Whitby.

Dr. D. CAPPON and Mr. R. BANKS have continued their studies into the role of orienting percepts (of the dimensions of time, space, body, etc.) in mental illness. Under a National Health Grant the phenomena of depersonalization and derealization are being investigated to seek objective correlates of the subjective perceptual changes and distortions. Further Dr. Cappon has continued his interest in the attitudes of patients and non-patients towards death, and in the percepts of sleep dreams as they emerge from a state of altered and diminished sensory input.

Dr. J. B. FOTHERINGHAM has completed some preliminary studies on the effect of maternal emotional distress on the developing foetus. Both EKG and EEG studies of the child, *in utero*, indicate foetal participation in the mother's upset.

The problems of identifying and measuring mental functions continue to be imperfectly resolved. Dr. H. N. McLEOD has interested his team in the application of the Cattell 8-Parallel form anxiety battery and in patient performance on the Cattell 16 Personality Factor Questionnaire. This work is being done in collaboration with Professor R. B. Cattell of the University of Illinois. The Kahn test of symbol arrangement and the Grassi Block Design Substitution test are being critically appraised.

Dr. B. QUARRINGTON with Mr. C. GREENLAND are inquiring into the oscillation of feeling states. Groups of normal subjects have reported their mood and energy level, thrice daily, over a standard observation period of three months. The analysis of data is proceeding.

Dr. Quarrington and Mr. E. DOUGLASS have been studying stuttering. Experimental studies of linguistic factors, particularly word position, have been carried out. The utility of approach-avoidance conflict conceptions in stuttering is under investigation. Mr. Douglass has been particularly interested in the aversive conditioning of stuttering behaviour and in the study of delayed auditory feedback.

Dr. H. C. HUTCHISON and his psychologist colleagues in the Forensic Division have continued their studies on lie detection, personality test difference between normal and neurotic subjects and the diagnostic problems within the area of sex deviation. Dr. J. W. MOHR in particular has contributed some excellent follow-up studies of sexual offenders. Important new information has been obtained giving much greater precision to the hitherto overlapping problems of the exhibitionist, the pedophile and the homosexual.

Group studies of forensic patients have been undertaken by Mr. V. HARTMAN and Mr. D. PAITICH. Dr. T. J. MALLINSON and Mr. F. TOOMBS continue in their various studies of group relationships. Dr. E. J. ROSEN and Dr. A. SLEMON have been particularly involved in group studies of emotionally disturbed children.

Clinical Studies continue importantly. Dr. R. E. TURNER has interested himself in the problems of treating sex offenders by both group and individual therapies. Treatment as an alternative to imprisonment, in selected cases, may now be offered the courts on reasonable and proven grounds. Dr. A. BONKALO has been concerned with acute schizophrenia episodes and Dr. D. J. LEWIS with Lilliputian hallucination. Dr. P. H. MELVILLE has been appraising the effects of immigrant attitudes to illness on symptomatology. Dr. D. J. McCULLOCH of the Out-Patient Service at the Ontario Hospital, Toronto, has been processing a very large volume of data obtained by a research into factors effecting change in patients undergoing psychotherapy at a clinic. He and his colleagues are also comparing matched psychiatric and non-psychiatric cases in terms of differences in life biography. Dr. J. D. ARMSTRONG has continued his studies of alcoholism and drug addiction.

Two important follow-up studies are nearing completion. Dr. W. R. MITCHELL is involved in following up a large group of children admitted to the Toronto Psychiatric Hospital for treatment ten years or more ago. Dr. A. MILLER is undertaking a ten-year follow-up of lobotomy cases.

These and many other inquiries of a less structured kind are indicative of a questing enthusiasm. The continuing need is to delimit areas of questioning for the purposes of critical disciplined approach.

Thanks for generous financial support are due to both the Federal and Provincial Governments, the Medical Research Council, pharmaceutical companies, and a large number of private donors contributing to the Psychiatry Advancement Fund. As far as research is concerned the year's work has not been dramatic but it has been significant, allowing a wholesome faith in future endeavours.

#### PSYCHIATRY

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## RADIOLOGY

*Under the direction of Professor A. C. Singleton*

There has been no essential change in the undergraduate or postgraduate teaching in the Department during the past year. Conferences between this department and other clinical departments have been extended and are of increasing value in teaching and particularly at the graduate level. Additional space for teaching has been obtained in the Department of Radiology of the Western Hospital. The postgraduate course leading to the diploma in Medical Radiology continues to attract postgraduate students and it is a pleasure to report that six candidates have obtained their D.M.R. diplomas this year.

During the year 1961-2, in addition to routine duties, members of the staff gave lectures and papers to other than local groups, as follows. R. B. HOLMES addressed the Detroit Roentgen and Radium Society, February, 1962, on "Aortography using Image Amplification and Television." W. E. C. ALLT: "Tantalum Wire Implantation for Treatment of Skin Cancer," Second South American Cancer Congress, Mexico

City, Mexico, October, 1961; Panelist on "A Proposed Formulary Service in Ontario," Ontario Branch, Canadian Society of Hospital Pharmacists, Toronto, Ontario, April, 1962. C. L. ASH: "Cancer of the Larynx," Gordon E. Richards Memorial Lecture, Annual Meeting Canadian Association of Radiologists, Winnipeg, Manitoba, January, 1962; Panelist on "Carcinoma of the Larynx," Annual Meeting, American Radium Society, New York, April, 1962; "Intra-Oral Carcinoma," Radiology Postgraduate Course sponsored by the Department of Radiology, Kings County Hospital Center and Brooklyn Radiological Society, Brooklyn, New York, April, 1962. J. M. M. DARTE: "Bronchogenic Carcinoma," Clinical Conference on Primary Carcinoma of the Lung, Ontario Cancer Treatment and Research Foundation, Kingston, Ontario, November, 1961. "Radiation Sickness in Man," Academy of Medicine, London, Ontario, January, 1962. Chairman, Round Table Conference on "Nuclear Radiation, Injuries and Protection," Ninety-fifth Annual Meeting, Canadian Medical Association, Winnipeg, Manitoba, June, 1962. M. V. PETERS: "Indications for Radiotherapy during the Course of Hodgkin's Disease," Refresher Course, American Roentgen Ray Society, Miami Beach, Florida, September, 1961; "The Attitude of the Cancer Patient," Staff Conference, Ontario Division, Canadian Cancer Society, Toronto, February, 1962; Panelist on "The Problem of the Breast Lump," Second Annual Postgraduate Refresher Course for General Practitioners, Toronto, Ontario, February, 1962; Round Table Conference on "The Management of the Patient with Advanced Solid Cancer," Ninety-fifth Annual Meeting, Canadian Medical Association, Winnipeg, June, 1962. W. D. RIDER: "Choriocarcinoma," Annual Meeting, Society of Obstetricians and Gynaecologists of Canada, Minaki, Ontario, June, 1962; "Radiation Therapy in the Management of Cancer of the Tonsillar Area," Annual Meeting, Radiological Society of North America, Chicago, Illinois, November, 1961. W. J. SIMPSON: "Radioisotopes in the Measurement of Organ Function," Seminar on Isotopes, Annual Meeting, Royal College of Physicians and Surgeons of Canada, Toronto, January, 1962; "Radio Iron Studies in Polycythemia," Annual Meeting, Society of Nuclear Medicine, Pittsburgh, Pennsylvania, June, 1961.

## RESEARCH

*Reported by Professor A. C. Singleton*

Dr. R. B. Holmes has completed his study on "The Role of Angiocardiography in the Diagnosis of Pericardial Disease," and has continued his research in "Application of Television in Amplification and Recording of Fluoroscopic Images." He is also investigating new techniques in demonstrating Venous Disease of the Lower Extremity.

Dr. Holmes and Dr. A. M. Rappaport are continuing their study on "Hepatic and Renal Venography."

Dr. Holmes and Dr. R. F. Colapinto (Picker Research Fellow) have initiated a research on "Radiological Aspects of Coronary Artery Disease." They are also investigating the "Cine Radiological Features of Aortic Insufficiency."

Dr. G. Wortzman in co-operation with Dr. F. P. Dewar of the Division of Orthopaedic Surgery has been conducting research on "Atlanto Axial Dislocations." With Dr. Ian MacNab of the Division of Orthopaedic Surgery he is conducting a research on "Lumbar Discography and its Clinical Applications."

Dr. J. D. Munn, in co-operation with Professor Norma Ford Walker of the Department of Genetics, has been continuing the investigation of "Congenital Dislocation of the Hip in Children."

Dr. C. A. F. Moes is conducting a research on "Diastematomyelia in Children."

Dr. A. Humphry is investigating "The Occurrence of Congenital Anomalies of the Urinary Tract."

Dr. B. J. Reilly is investigating "Coxa Vara as part of a more generalized Dysostosis," the "Possible Incidence of Gall Stones in Postoperative Cases of Tetralogy of Fallot," "Craniosynostosis in Rickets," and "Three Dimensional Study of Velo-pharyngeal Sphincter."

Dr. E. Meema, Dr. Rapoport, Department of Medicine, and Dr. M. L. Bunker, Department of Gynaecology, are continuing their research in "The Occurrence of Cortical Bone Atrophy in Old Age and in Osteoporosis."

*Reported by Professor C. L. Ash*

This year the clinical staff of the Ontario Cancer Institute (Princess Margaret Hospital) has been granted over \$84,000 by the Ontario Cancer Treatment and Research Foundation and \$5,000 by the Defence Research Board in support of its clinical research programme.

As in previous years, analyses of treatment methods, survival rates and patterns of disease have been carried out and are continuing on a statistical basis. Currently, tumours of the larynx, testicle and breast are being evaluated. The method of predicting survival rates on a statistical basis has now been completed; there are several mathematical models which fit the data obtained.

In collaboration with the Division of Physics electron beam therapy has been extended to treatment of widespread Mycosis Fungoides by a suitable adaptation of the betatron. Two of three cases treated have shown a dramatic response.

Studies of the physiology of response to irradiation continue and it appears that a distinct pattern of physiological disturbance has been discovered. It is believed that the findings are of a fundamental nature. The project is progressing satisfactorily and enlarging in scope.

Investigations have been directed to the study in more detail of the immune mechanisms associated with malignant disease, in particular the effects of Cytotoxic drugs and radiation on these mechanisms. This work is being pursued as part of the Choriocarcinoma programme.

The work on body scanning techniques has continued and has been considerably extended during the past year. It is proposed to build a larger and more efficient scanning apparatus. Some measure of success has attended the use of Strontium<sup>85</sup> in the localization of bony metastases which are not visible radiographically. In addition, radio-copper studies have been carried out in Wilson's disease. The scanner has also been used to determine the distribution of radioactive human albumen, both before, during, and after radiation, as part of methods to determine the feasibility of localizing specific antibodies in tumour areas by means of radiation. Kidney scans using Neohydrin labelled with Mercury<sup>203</sup> have been initiated in conjunction with the Department of Medicine of the Toronto General Hospital. Many radioactive scans are now done routinely as part of clinical investigation.

An investigation into the phosphorous metabolism of certain large breast tumours has been initiated recently.

The study of the circulating malignant cell in patients with breast and lung cancer has been continued with investigation of the relationship of radiation to the level of these cells.

Lymphangiography in the study of lymph node metastases associated with malignant conditions was initiated in January, 1962, as a combined study by the Diagnostic and Therapeutic Departments. From preliminary studies it would seem that this procedure is of value in certain selected cases, particularly of lymphomas and testicular tumours. To date some fifteen cases have been studied.

## RADIOLOGY

ASH, C. L. "Oral Cancer: A Twenty-five Year Study" (*American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, vol. 87, no. 3, 1962, pp. 417-30).

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## SURGERY

*Under the direction of Professor F. G. Kergin*

During the past year attention has been turned to an appraisal of the results which are being obtained in the graduate training programme in surgery operated through this Department. All surgical training appointments in the Toronto General Hospital, St. Michael's Hospital, the Toronto Western Hospital, the Hospital for Sick Children, the Wellesley Hospital and Sunnybrook Hospital (DVA), are occupied by members of the training course. Trainees commonly have appointments in two or more of these hospitals during the course. Training is offered in the specialties of general surgery, cardiovascular surgery, neurosurgery, orthopaedic surgery, plastic surgery and urology.

During the year 74 members of the course occupied assistant resident or resident positions in the teaching hospitals. Research fellowships were held by 13 other members, under the guidance of members of the Department. In addition, experience in general surgery was provided for 6 members of the training course in Obstetrics and Gynaecology and 2 members of the course in Otolaryngology.

One measure of success of a training course in a clinical science is the passing rate achieved by its members in the Fellowship examination of the Royal College of Physicians and Surgeons of Canada. Dr. N. T. McPhedran studied the results obtained by our trainees during the six-year period ending in 1961. During that time 61 candidates, who had taken their entire graduate training in our teaching hospitals, attempted the examination. Of these, 45 or 74 per cent passed on the first attempt, and, to date, a further 3 have passed on a second or third attempt, giving a pass rate to date of 79 per cent. Forty-five of the candidates were graduates of the University of Toronto; 39 passed for a passing rate of 87 per cent. Sixteen of the candidates were graduates of other Canadian or foreign schools; 9 passed for a passing rate of 56 per cent.

When it is remembered that the passing rate for the entire group trying this examination is in the neighbourhood of 30 per cent, the results quoted appear reasonably satisfactory.

This study confirms our impression that candidates who have ranked in the upper third of the class in the clinical years of their undergraduate course are almost certain to pass the Fellowship examination and, conversely, those with a poor academic record not infrequently fail.

The teaching hospitals continue with important building programmes which will add to the facilities of their Department of Surgery. At the Toronto Western Hospital the new Nassau Wing was opened and provides special operating rooms for cardiovascular surgery, neurosurgery and orthopaedic surgery, a large recovery room and an area for intensive therapy. The wing will provide about 150 new beds, including joint units for cardiology-cardiovascular surgery and neurology-neurosurgery. At the Toronto General Hospital the new accommodation for cardiovascular surgery was officially opened on Friday, January 19. The guest speakers on this occasion were Dr. Henry Swan of Denver, Colorado, and Dr. Edouard D. Gagnon of Montreal. At the Hospital for Sick Children a large building project is under way to provide increased laboratory space, add more operating rooms and about 150 beds and to enlarge the Emergency Department. St. Michael's Hospital and the Wellesley Hospital are planning major additions.

The Balfour Lecture was given on Friday, April 6, by Professor Charles Rob, Chairman of the Department of Surgery of the School of Medicine and Dentistry of the University of Rochester, on the subject "The Surgery of Atherosclerosis." The

lecture, based on an unusually wide clinical experience, was beautifully illustrated by slides and was a most convincing exposition of the value of surgical treatment for certain types of arterial obstruction.

Members of the Pittsburgh Surgical Society paid a two-day visit to the Toronto General Hospital and the Hospital for Sick Children on Friday and Saturday, April 27 and 28. Operative clinics were held and programmes of scientific papers given in both hospitals.

Dr. Harry Botterell has resigned from the Department and as Surgeon-in-Charge of the Division of Neurosurgery of the Toronto General Hospital to take up an appointment as Dean of the Faculty of Medicine of Queen's University on July 1, 1962. Dr. Botterell's contributions to neurosurgery have received international recognition; he has developed an extremely strong division at the Toronto General Hospital and as Chairman of the Committee for Neurosurgery of this Department he has guided wisely the undergraduate teaching of his specialty and the graduate training programme. Our good wishes go with him to Kingston. Dr. T. P. Morley succeeds him at the Toronto General Hospital.

Dr. L. T. Barclay, who for many years has served at the Toronto Western Hospital as Senior Plastic Surgeon, retired from this Department and from the active staff of that Hospital at the end of the academic year to become a Consultant in Surgery to the Hospital.

Dr. A. W. M. White resigned at the end of 1961 from this Department and as Senior Orthopaedic Surgeon to the Toronto Western Hospital, to accept an appointment as Consultant Orthopaedic Surgeon to the Workmen's Compensation Board of Ontario. His long and devoted service to the Toronto Western Hospital, where he will remain a Consultant, is much appreciated.

Dr. P. F. McGoey resigned from this Department and from his position as Senior Orthopaedic Surgeon at St. Michael's Hospital on June 30, 1962, to become Surgeon-in-Chief of the Scarborough General Hospital. His colourful and effective teaching will be missed by the students and interns at St. Michael's Hospital.

There have been two additions to the Staff of the Department of Surgery of the Hospital for Sick Children this spring. Dr. J. C. Fallis was appointed to the Division of General Surgery after completing a six months' tour of paediatric surgical centres in the United States. Dr. H. G. Thomson was appointed to the Division of Plastic Surgery after spending six months visiting centres in Great Britain on a McLaughlin Travelling Fellowship.

Dr. V. Colapinto has joined the Staff of the Division of Urology at St. Michael's Hospital at the beginning of this academic year after spending eight months on a McLaughlin Travelling Fellowship during which he worked with Professor Pyrah's unit in Leeds for six months and spent the remaining time visiting urology clinics in the United States.

Dr. J. A. MacDonald returned to join the Staff of St. Michael's Hospital in General Surgery after spending six months in Chicago working with Professor Warren Cole's group in cancer research and brief visits to other centres in the United States. He was supported by a fellowship granted by the Canadian Cancer Society under the Gordon E. Richards Awards.

The Head of the Department gave the Canadian Cancer Society Lecture, and two other lectures at the Sixth National Scientific Assembly of the College of General Practice of Canada. Dr. W. G. Bigelow was invited to be guest lecturer at the Postgraduate School of the University of California, where he delivered three lectures on Hypothermia.

## RESEARCH

### *Cardiovascular Surgery*

As a by-product of the research into hibernation by a team directed by Dr. W. G. Bigelow, certain compounds containing butyl and ethyl alcohol have been found

to increase, very significantly, the tolerance for low-body temperatures of non-hibernating animals. Pharmacological assessment of these compounds is in progress. Dr. B. Goldman has successfully implanted brown fat grafts from the "hibernating gland" of groundhogs into guinea pigs using the millipore membrane technique.

A followup study has been made of a small group of patients treated up to eight years ago for disabling angina pectoris by transplantation of the internal mammary artery into the myocardium. Cineradiographic studies have yielded the first reported objective evidence of patency and function of this artery.

Dr. R. J. Baird, by experimental methods, has demonstrated a significant decrease in the work of the left heart by a partial by-pass of the left ventricle and is preparing to use this method of cardiac support clinically. His attempts to replace the femoral vein in experimental animals by an autogenous vein graft using various anticoagulants have, to date, been unsuccessful. Clinical research includes assessment of intra-arterial oxygen as a vasodilator, mannitol as a diuretic during surgical obstruction of the aorta and the function of various prosthetic aortic valve replacements.

Dr. R. O. Heimbecker, with Dr. N. E. Hamilton, has continued his study of the transplantation of homograft mitral and tricuspid valves; success in the experimental animal has encouraged him to perform this procedure on a human patient. He has completed and reported his study of "ice chip cardioplegia." In the experimental animal he is producing and excising infarcts of the wall of the left ventricle and investigating the effects of this procedure on cardiac function. A study of highly porous arterial prostheses is in progress.

Dr. J. A. Key is investigating the effect of dividing the superficial femoral artery in patients with severe rest pain who have radiographically demonstrated complete occlusion of that artery.

Dr. H. F. Robertson has found that application of hydrogen peroxide to the experimentally produced infarct in the dog's heart is not of value in preventing necrosis of cardiac muscle.

At the Hospital for Sick Children Dr. W. T. Mustard and Dr. G. A. Trusler have collaborated with Mr. Ian Dalton, of the Department of Electrical Engineering of this University, in designing an electronically controlled infant oxygenator of low priming volume. In this study Dr. W. B. Firor and Dr. J. H. Wait have assisted as Fellows in the Research Institute of the Hospital for Sick Children. Dr. Mustard and Dr. Wait have investigated the function of the tricuspid valve and the effects of excision and replacement of the septal leaflet. Dr. Trusler and Dr. Firor have made a study of the use of hypothermia in young patients with reduced cardiac output following operations on the heart.

### *General Surgery*

Dr. N. C. Delarue has been very ably assisted by Dr. R. E. Falk in a variety of clinical investigations of the biology of cancer. These include: A follow-up study of treated patients who showed circulating malignant cells in the peripheral blood; a double-blind study of the value of chemotherapy as an adjuvant to excisional therapy for lung cancer; a study of the chromosome variations in malignant cells, and the value of chemotherapy as an adjuvant to radiotherapy for unresectable cancer of the lung.

Dr. J. C. Gray, Dr. M. I. Davis and Dr. O. Ibberson are continuing a clinical study of the results obtained in a large series of patients treated at the Women's College Hospital for carcinoma of the breast.

At Sunnybrook Hospital(DVA), Dr. A. W. Harrison, with Dr. Fraser Mustard, has been investigating the clotting mechanism in patients with severe upper gastrointestinal haemorrhage or who develop a bleeding tendency after an operation.

Dr. N. T. McPhedran, with the assistance of Dr. R. E. Mathews, has continued his studies of the etiology of acute and chronic pancreatitis in the experimental animal and the relationship to various dietary factors. In collaboration with members

of the Departments of Medicine and Pathology and the Connaught Laboratories, a study of a malignant islet cell tumour of the pancreas, obtained at autopsy from a human patient, has been done. Using an ingenious animal preparation it has been shown that the diarrhoea, which was the main feature of the clinical picture, is due to gastric hypersecretion and not by direct effect on the intestine. Attempts to demonstrate a gastrin-like hormone in the normal pancreas of animals are continuing. A clinical study of calcium and steroid metabolism in patients with acute pancreatitis is under way with the collaboration of Drs. E. R. Yendt and J. C. Laidlaw of the Department of Medicine.

Dr. R. I. Mitchell, in association with Dr. D. G. Baker of the Banting and Best Department of Medical Research, has studied the effects of radiation on the intestinal tract of experimental animals and the protection which may be afforded by various drugs. He is also investigating the enzyme component of the cells of the gastro-intestinal tract.

Dr. J. E. Mullens has continued his association with Dr. A. McKay, of the Ontario Veterinary College, in a study of a possible relationship between the endotoxins of *E. coli* and enteritis as produced in the experimental animal and seen in human patients.

Dr. F. G. Pearson, under a grant from the Ontario Cancer Treatment and Research Foundation, has been attempting to develop a method for replacing segments of the entire circumference of the trachea in the experimental animal. To date he has not surmounted the difficulties encountered by others.

Dr. C. A. Stephens is directing Dr. J. G. Desjardin in a very exhaustive study of the abnormal anatomy and physiology of the oesophagus in the survivors of 305 patients treated for congenital oesophageal atresia between 1939 and 1961 at the Hospital for Sick Children.

### *Neurosurgery*

The continuing study of the results obtained by the surgical treatment of arterio-venous malformations of the brain, initiated by Dr. E. H. Botterell, is being continued by Dr. S. Schatz at St. Michael's Hospital and Dr. W. M. Lougheed at the Toronto General Hospital.

Dr. J. F. R. Fleming, at the Toronto Western Hospital, is examining the morphology of lesions in the basal ganglia of experimental animals produced by stereotaxic methods.

Dr. W. M. Lougheed has turned his attention to investigation of methods of producing profound local cerebral hypothermia. Experimental observations indicate the practicability of this method of allowing prolonged arrest of the circulation of the brain in human patients. He is also examining methods of vessel repair applicable to the cerebral circulation.

Dr. R. R. Tasker has been handicapped in his investigations of the physiology and anatomy of the basal ganglia by delay in constructing his laboratory in the Banting Institute. However, by courtesy of Professor Charles Best and Professor John Scott, he has used the facilities of the Best Institute to initiate a study of the Parkinson-like syndrome produced in experimental animals by chronic manganese poisoning with and without choline deficiency. Also a study has been made of drug-induced Parkinson-like states in the rat. In the Neurosurgical Unit of the Toronto General Hospital clinical studies of Parkinson's disease and related conditions have been continued and therapeutic methods modified and improved.

### *Orthopaedic Surgery*

Dr. F. P. Dewar, with Dr. D. A. Gibson, the Mary and Wallace Duncan Fellow in Orthopaedic Surgery, has done a follow-up study of the results of McMurray osteotomy in patients treated between 1950 and 1960. With Dr. J. J. Wiley, the Workmen's Compensation Board Fellow, he has investigated spondylosis occurring after spinal fusion, reviewed the results of lumbar and lumbo-sacral fusion and

studied the value of lumbar discrography. With Dr. T. A. Wright, and in collaboration with the Department of Radiology, a review of clinical examples of altanto-axial rotatory subluxation has been begun.

Dr. W. R. Harris, directing Dr. Marvin Tile, has continued the investigation of the physiology of bone growth. A method for transplanting the epiphyseal plate in young animals has been devised which is consistently successful when used as an auto-transplant, but less so as a homo-transplant. The repair of traumatic lesions of the epiphysis has been studied experimentally.

At St. Michael's Hospital Dr. P. F. McGoey and Dr. J. G. Evans have maintained a continuing study of the morbidity and mortality associated with fractures of the neck of the femur and are comparing the results obtained by modern replacement arthroplasty procedures with those obtained by earlier conservative methods.

At the Banting Institute Dr. Ian Macnab, assisted by Dr. R. G. Vanderlinden and Mr. H. F. Pierce, has continued the exhaustive study of the merits of a great variety of cold-setting plastics as material for orthopaedic use. These materials are being used for palliation in patients suffering from malignant disease, particularly of the spine, and long-term animal experiments are being carried out to discover any carcinogenic effects. Information about the pathology of whip-lash injuries of the neck has been gained using monkeys as the subject of an experiment designed to reproduce the forces involved in this injury. The possible use of bone which has been deproteinized and then reproteinized with recipient plasma as a modification of banked bone is being studied in experimental animals.

Dr. G. F. Pennal has completed an intensive study of fractures of the pelvis resulting in conclusions in regard to the forces acting in this injury in relationship to displacement produced, a classification of these fractures and principles in treatment. A monograph is being prepared and an illustrative film has been shown at orthopaedic meetings. With Dr. G. A. McDonald he has reviewed the results of treatment in 200 patients treated for low back pain by spinal fusion and, using a mechanical apparatus, is investigating the stresses involved in rupture of the intervertebral disc.

At the Hospital for Sick Children Dr. R. B. Salter has continued his experiments on the effects of fixation of joints on articular cartilage. With Dr. J. Schatzker he has produced dysplasia of the hip joint in newborn pigs by causing abnormal positions in the hind limb and has reached certain conclusions in regard to the etiology of congenital dislocation of the hip as seen in human patients. An exhaustive study of the blood supply of the femoral head in pigs has lead to an experimental method for causing a condition like Legg-Perthe's disease by selective obliteration of the blood supply to the epiphysis. A clinical study of the results obtained by the treatment of club feet is being pursued by the continuing observations of more than 200 treated patients in the Club Foot Clinic.

### *Plastic Surgery*

Dr. A. W. Farmer is continuing his studies of the effects of thermal burns on protein metabolism.

Dr. S. D. Gordon, with Dr. William Anderson of the Department of Pathology, is undertaking experiments on rabbits in an attempt to elucidate the pathogenesis of the calcification which may occur in certain tendons and ligaments in immediate contiguity to joints. They are also examining the morphological changes which occur in muscles in which the only injury is detachment of the muscle from its insertion.

Dr. W. K. Lindsay, in collaboration with Professor Sylvia Bensley of the Department of Anatomy and assisted by Dr. J. R. Birch, has continued his intensive experimental study of tendon repair. By using radioactive materials he is tracing the origin of the repair tissue and studying the fate of the old collagen of tendon. He has also initiated a study of wound healing in the human subject by examination of autopsy material.

### *Urology*

Dr. P. O. Crassweller, at the Toronto Western Hospital, under a grant from the Ontario Cancer Treatment and Research Foundation, has been associated with Dr.

A. E. Dyer of the Connaught Laboratories, in a study of urinary gonadatropins in male patients. They have been unable to demonstrate chorionic gonadatropins in healthy patients between 15 and 50 years of age and are now extending this study to include patients with acute testicular disease.

At the Hospital for Sick Children Dr. R. D. Jeffs, assisted by Dr. D. R. McTavish, has continued his study of methods of transplanting ureters into bowel with special reference to the prevention of reflux. A further study in the experimental animal has been undertaken to produce pure unobstructed pyelonephritis as an experimental model against which to test various treatment regimens.

Dr. W. K. Kerr, with the assistance of Dr. Martin Barkin, has continued his study of urinary carcinogens.

## SURGERY

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## THERAPEUTICS

*Reported by Professor K. J. R. Wightman*

The Department has functioned without a Head, through the efforts of the Fellow, Dr. D. Wood, and members of the Department of Medicine, Dr. C. C. Gray, Dr. M. A. Ogryzlo, Dr. B. Berris and Dr. W. T. W. Clarke. Each took on the theatre clinics for one term. The lecture course was divided among other members of the medical staff. The tutorial sessions in fourth year were given by Dr. Topp, Dr. Dwyer and Dr. Walfish. The clinical Pharmacologic Conferences were carried on as before.

There is still a need for a method of giving students a sense of proportion in the treatments and investigations they order for individual patients. The bewildering increase in new drugs still continues, and information as to their value is hard to come by.

## RESEARCH

Dr. Wood and Dr. B. E. Hazlett have continued studies with radioisotopes in haematologic disorders. A steady increase in the demand for these tests has been

noted, which include studies of vitamin B12 absorption (126), red cell survival tests (19), blood volume estimations (75). Dr. Wood has also co-operated with Dr. B. A. Tobe in a study of the changes in ammonia content after incubation of the red blood cells *in vitro* in various diseases.

## THE DIRECTOR OF THE BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

It is occasionally useful to note what people outside of our own Department are saying about the members of our staff. In his prefatory chapter in the 1960 *Annual Review of Biochemistry*, the late Dr. H. O. L. Fischer, then Chairman of the Department of Biochemistry of the University of California, paid a tribute to Professor C. C. Lucas, who helped Dr. Fischer and Dr. Erich Baer when they came to Canada to "adjust ourselves to Canadian thoughts and habits and also corrected or even rewrote our first publications to make them acceptable for the *Journal of Biological Chemistry*." Professor Baer was awarded the Chemical Institute of Canada Medal for 1962 and delivered the Medal Lecture on May 28, 1962, at the C.I.C. Conference and Exhibition held in Edmonton. The Medal is the highest award of this society. Professor C. W. Sheppard, Professor of Physiology in the University of Tennessee Medical Units and one of the great international experts on basic principles of tracer methodology, has referred on a number of occasions in his recent book to the constructive criticism and fine scientific contributions of Professor G. A. Wrenshall. Professor W. R. Franks, on April 11, 1962, was presented with the Eric J. Liljencrantz Award and a five hundred dollar honorarium by Admiral James Lee Holland, President of the Aerospace Medical Association. Dr. John Logothetopoulos has been invited to attend and to contribute to the Gordon Research Conference on Metals and Metal Binding in Biology in August, 1962. This is a tribute to his recent work on the significance of zinc in the pancreas and in other glandular tissues.

Studies on the mechanism of the lipotropic action of choline have been continued by Dr. D. S. M. Haines and Dr. S. Mookerjee. In particular, the relationship between changes in liver and plasma lipid fractions during the onset of and recovery from choline deficiency has been investigated. It has been found that all plasma lipid fractions decrease during the onset of choline deficiency but the triglyceride decrease is most pronounced and is closely correlated with accumulation of lipid in the liver. The reverse changes are seen during recovery. These findings support the view that the fatty liver of choline deficiency is due to an impairment of the ability of the liver to release triglyceride into the blood plasma. In association with Dr. N. Morley, Dr. Haines has conducted further experiments on the influence of choline deficiency upon the lipaemia of alloxan diabetic rats. Dr. Morley is also investigating the effect of choline deficiency upon spontaneous activity of rats. She is developing a microtechnique for the estimation of plasma triglyceride and is studying the problem of determining the free choline content of blood.

Dr. B. Rosenfeld and Miss Jessie M. Lang have extended their studies of the redistribution of lipid in rat liver homogenates and have investigated the *in vitro* effects of lipotropic agents on this reaction which they discovered. The significance of this lipid redistribution in the intact animal is being explored.

Dr. Anna Sirek in collaboration with Dr. A. Renold (Harvard Medical School, Boston) has investigated the persistence of insulin-like activity in sera of totally depancreatized dogs. Acid alcohol extracts from sera of these animals exhibited considerable insulin-like activity which could be abolished by exposure to insulin antibodies. Studies of serum glycoproteins in offspring of normal and diabetic animals were carried out in collaboration with Professor O. Sirek.

Dr. E. Napke has conducted preliminary experiments on the change in volume of the lumbar spinal sac due to posture and to increasing intra-abdominal pressure.

He is also studying the physical and chemical nature of epidural fatty tissue in dogs and human subjects.

Professor C. C. Lucas and Dr. Jessie H. Ridout have been continuing their studies of the effect of different dietary proteins upon the development of hepatic lesions in rats, both in those drinking water and in animals consuming dilute alcohol (15 per cent) in place of water. They have also examined the effect of varying the ratio of starch to sucrose in the diet upon the production of cirrhosis. Diets containing a moderate amount of starch delay, but do not prevent, the development of cirrhosis in rats fed these purified hypolipotropic diets. Professor Lucas and Dr. Ridout have devoted some time to helping Professor Best with the preparation of material for a new book.

The work in Professor Wrenshall's section continues to deal primarily with phenomena of diabetes mellitus. Validation for glucose of the method of successive measured injections of tracer has now been extended from eviscerated to normal dogs. The method is being applied to determine the sequence and magnitude of changes in the production, accumulation, utilization and excretion of glucose in the dog during diabetogenesis. Tracer studies of glucose turnover in specific regions of the living dog and rat are also in process. The preparation of a book dealing with the story of insulin over the forty years has been completed in co-operation with Professor G. Hetenyi and Dr. W. R. Feasby.

In the Sub-department of Synthetic Chemistry, Professor Baer and his colleagues, Professor D. Buchnea, Drs. A. Kindler, F. Eckstein, Y. Suzuki, H. Pohland, and G. Venkat Rao, ably assisted by Mr. H. Flehmig, continued their syntheses of naturally occurring glycerolphosphatides. Mixed-acid phosphatidic acids and bisphosphatidic acids (Buchnea) and a phosphatidyl 1, 1-dimethylethanolamine (Rao) were prepared, and new procedures for the synthesis of saturated and unsaturated alpha-lecithins (Pohland) and alpha-cephalins (Suzuki) were developed.

In Professor Franks' section, with the assistance of Miss A. McGregor, Miss M. M. Shaw and Mr. J. Skublics, the previously reported induction of a degree of resistance in a host to its tumour by substituting for its own inadequate defence mechanisms bone marrow plus lymphoid grafts from donor animals made resistant to the host's tumour (immune graft-hybrid or chimera procedure) has been extended. An attempt has been made to exploit the resistance so induced to gain success by other means of therapy. It has been found possible to induce a temporary, autoclastic, graft-hybrid state in a mouse from which, following irradiation, it can survive, purged of even multiple tumours which recurred following surgical failure. Many pertinent graft vs. host variants remain to be explored, including host, organ and tumour specific factors. With Mr. Charles Lennox, further studies have been carried out on the effect of apprehension (adrenalin) and of glucagon hyperglycaemia on the post mortem brain lactic acid concentration during hypoxia. With Mr. G. A. Meek the co-operative studies on the effect of high energy vibrations have been continued.

In Professor J. M. Salter's section, the distribution of lipids in the blood and liver of normal and choline deficient rats was investigated by Dr. C. K. Gorman and Miss E. Montgomery. The results support those obtained by Dr. Haines and his group. Drs. R. Metz, Gorman, Salter, and Dr. Juan Penhos of Professor Houssay's laboratory, performed studies with rat-liver tissue *in vitro* and with isolated perfused livers that have revealed many of the basic causes of the inhibition in protein and fat anabolism produced by glucagon *in vitro*. Dr. Salter and Miss S. C. Ruedy have continued their investigation of amino acid metabolism in normal and malignant tissue. The results indicate that the metabolism of the host is greatly altered by lactic acid which the neoplasm produces. Factors responsible for antagonizing the protein anabolic action of insulin *in vivo* were also studied by Mr. S. G. Ilk.

In Professor J. Logothetopoulos' section studies on the cellular mechanism of insulin secretion and on the cytochemistry of the islet cells have been continued. In collaboration with Dr. J. Kraicer the mechanism of corticoid release during hypoglycaemia was investigated. The protective action of glucose against the diabetogenic

actions of alloxan was studied in collaboration with Dr. M. Kaneko, a visiting scientist from Japan.

Professor D. G. Baker's section has continued to investigate the physiological and biochemical basis of radiation injury. In collaboration with Dr. R. Mitchell (Department of Surgery, Wellesley Hospital) biochemical changes in various segments of the intestinal tract during acute radiation injury have been investigated. Segmental differences in radio-sensitivity and recovery have been demonstrated. Mr. G. A. Vivian has shown that time and intensity factors are able to modify the resistance of the intestinal tract to radiation injury. In collaboration with Dr. A. Carsten (Brookhaven National Laboratories, Long Island, N.Y.) the influence of X-irradiation on the composition of the plasma proteins has been investigated. The qualitative changes (electrophoretic mobility in starch gels) which were observed in certain of the proteins as a late effect of radiation injury were of special interest. In collaboration with Dr. R. Ghys (Department of Biochemistry, Laval University) a study concerning the influence of low environmental temperature on radioresistance has been undertaken.

Mr. C. R. Cowan, Comptroller, and Mr. K. R. Bowler, Administrative Assistant, continued their indispensable services to the members of the Department of Physiology as well as to the staff of this Department. In addition to their regular duties they assumed much of the responsibility for advising and aiding the Superintendent's Office, architects and builders in connection with the new wing which was added to the Charles H. Best Institute during 1961-1962.

The University is installing a plaque on each of the research floors of the new wing. It reads as follows:

UNIVERSITY OF TORONTO  
THE WELLCOME RESEARCH LABORATORIES  
IN THE CHARLES H. BEST INSTITUTE  
A GENEROUS GIFT FROM  
THE WELLCOME TRUST OF LONDON, ENGLAND  
HAS MADE POSSIBLE THE CONSTRUCTION OF  
THESE LABORATORIES FOR MEDICAL RESEARCH

C. H. BEST

#### BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

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